This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at http://books.google.com/

LANE MEDICAL LIBRARY STANFORD
N201 .B642 1906 STOR
The diseases of women : a handbook for s
24503454318

A. B. SPALDING, M. D

THE DISEASES OF WOMEN

A. B. SPALDING,

THE

DISEASES OF WOMEN

A HANDBOOK FOR STUDENTS AND PRACTITIONERS

BY

J. BLAND-SUTTON, F.R.C.S. Eng.
Surgeon to the Middlesex Hospital, and Senior Surgeon to the Chelsea Hospital for Women

and

ARTHUR E. GILES, M.D., B.Sc. Lond., F.R.C.S. Edin.
Surgeon to the Chelsea Hospital for Women, and Gynecologist to the Tottenham Hospital

FIFTH EDITION

WITH 129 ILLUSTRATIONS

LONDON
REBMAN LIMITED
129 SHAFTESBURY AVENUE, W.C.

NEW YORK
REBMAN COMPANY
1123 BROADWAY

1906

Entered at Stationers' Hall, 1906

All rights reserved

N201
B642
1906

LANE MEDICAL LIBRARY
SAN FRANCISCO

PREFACE TO THE FIFTH EDITION

In this edition much new matter has been introduced, especially in relation to Chorion-epithelioma, Extra-uterine Gestation, and Tumours of the Ovary, including an entirely new section on Metastatic Cancer of this organ. We still believe that when surgical authors are able to restrain their vanity, and refrain from publishing notes of successful cases in text-books, the established facts of the Art can be presented in a very convenient compass.

47, Brook Street, W.,
September, 1906.

33201

CONTENTS

CHAPTER PAGE

I. The Anatomy of the Reproductive Organs of Women - - - - - - - 1
II. The Physiology of the Reproductive Organs of Women - - - - - - - 14
III. Methods of Examination of the Female Pelvic Organs - - - - - - - 23
IV. Malformations of the Reproductive Organs - 35
V. Malformations (*continued*) - - - - 42
VI. Pseudo-hermaphrodism - - - - - 57
VII. Clinical Aspects of Malformations - - 62
VIII. Diseases of the Vulva - - - - - 75
IX. Cutaneous Diseases of the Vulva - - 85
X. Morbid Conditions of the Hymen, Clitoris, etc. 94
XI. Tumours and Cysts of the Vulva - - 100
XII. Diseases of the Vagina - - - - - 107
XIII. Vaginal Infection and the Vaginal Secretions - 117
XIV. Tumours and Cysts of the Vagina - - 127
XV. Age-changes and Displacements of the Uterus - 138
XVI. Diseases of the Uterus (*continued*) - - 148
XVII. Pessaries - - - - - - - 160
XVIII. Inversion of the Uterus - - - - - 166
XIX. Injuries of the Uterus - - - - - 173
XX. Diseases of the Endometrium - - - 181
XXI. Diseases of the Endometrium (*continued*) - - 191
XXII. Fibroids - - - - - - - 198
XXIII. The Modes in which Fibroids imperil Life - 211
XXIV. Fibroids in Relation to Pregnancy, etc. - 217
XXV. The Clinical Characters of Fibroids - - 224
XXVI. Sarcoma of the Uterus - - - - - 233
XXVII. Cancer of the Uterus - - - - - 238
XXVIII. Cancer of the Body of the Uterus - - 248

XXXVII. DISEASES OF THE OVARIES - -
XXXVIII. TUMOURS OF THE OVARIES, DERMOI
XXXIX. SOLID TUMOURS OF THE OVARIES -
XL. SECONDARY CHANGES IN OVARIAN T
XLI. DIAGNOSIS AND TREATMENT OF OVAR
XLII. DISEASES OF THE PELVIC PERITONEU
XLIII. TUMOURS OF THE MESOMETRIUM -
XLIV. AMENORRHŒA - - -
XLV. MENORRHAGIA AND METRORRHAGIA -
XLVI. DYSMENORRHŒA - - -
XLVII. DYSPAREUNIA AND STERILITY -
XLVIII. DIAGNOSIS - - - -
XLIX. DIAGNOSIS (*continued*) - -
L. GYNÆCOLOGICAL OPERATIONS -
LI. OPERATIONS ON THE PERINEUM, ETC.
LII. OPERATIONS ON THE UTERUS -
LIII. TRACHELORRHAPHY, ETC. - -
LIV. VAGINAL HYSTERECTOMY - -
LV. ABDOMINAL OPERATIONS (CŒLIOTOMY)
LVI. OVARIOTOMY AND OÖPHORECTOMY -
LVII. OPERATIONS ON THE UTERUS -

INDEX - - - -

DISEASES OF WOMEN

CHAPTER I

THE ANATOMY OF THE REPRODUCTIVE ORGANS OF WOMEN

THE essential organs of reproduction in a woman are two glandular bodies known as the **ovaries,** in which ova (eggs) are formed. The remaining organs, more or less subservient to the ovaries, are the **Fallopian tubes,** which conduct the ova to the **uterus,** in which, when fertilized, they are retained through the embryonic stages. The uterus communicates with the exterior by the **vagina,** a mucous tube which receives the intromittent organ (penis) for the purpose of impregnation. The orifice of the vagina is limited in the virgin by the **hymen.** The parts external to the hymen are termed the **vulva,** and consist mainly of modified skin arranged in folds. The folds of the vulva contain the peripheral end-organs concerned in sexual sensation, and some glandular structures, the secretion from which facilitates the introduction of the virile organ. Each part requires separate notice.

The Ovaries.—Each ovary is an olive-shaped body, somewhat compressed in its long axis, projecting from the posterior fold of the mesometrium. It lies near the brim of the true pelvis, surrounded on two-thirds of its circumference by the ampulla of the corresponding Fallopian tube. Each ovary is connected with the cornu of the uterus by a band of muscular tissue named the ovarian ligament. Morphologically, the ovary consists of two parts: that which forms its free surface is the egg-bearing part, and is called the **oöphoron**; the part in relation with the mesometrium is the **paroöphoron,** and represents the degenerated remains of the glandular part of the mesonephros. It contains no follicles, but is rich in bloodvessels.

The Parovarium.—This structure is easily seen, when the mesosalpinx is stretched and held between the eye and the light, as a series of tubules radiating from the ovary to join a longitudinal tubule situated at a right angle to them. Although the tubules converge as they enter the paroöphoron, nevertheless they remain distinct. Each tubule ends blindly, and is lined with epithelium. When present in its typical condition, the parovarium consists of three parts: an outer series of tubules, free at one extremity, known as Kobelt's tubes; an inner set, termed the vertical tubules (the parovarium contains, as a rule, twelve tubules; sometimes as many as seventeen may be counted, and in other specimens as few as five); lastly, running at right angles to the vertical tubules, there is a larger tube which may occasionally be traced downward to the vagina. This is **Gartner's** duct; it corresponds to the vas deferens in the male.

The Fallopian Tubes.—These tubes conduct ova from the ovaries to the uterus. Each tube is continuous with the superior angle of the uterus, posterior to the point of attachment of the round ligament. When straightened, a Fallopian tube measures on an average 4 inches (10 centimetres); it opens by a peculiarly fringed opening—the abdominal or cœlomic ostium—into the cœlom (peritoneal cavity). The inner (uterine) third or isthmus of the tube is tortuous and narrower than the outer two-thirds—termed the ampulla. Each Fallopian tube lies in the free border of that portion of the mesometrium known as the mesosalpinx. The ampulla of the tube embraces the ovary (Fig. 1). When an ovum escapes from the ovary it falls among the tubal fimbriæ, and gains the cœlomic ostium of the tube; it is then propelled by muscular contractions along the tube to the uterus. The outer end of the Fallopian tube is connected by a modified fimbria, termed the tubo-ovarian ligament, with the end of the ovary opposite to that which receives the ovarian ligament.

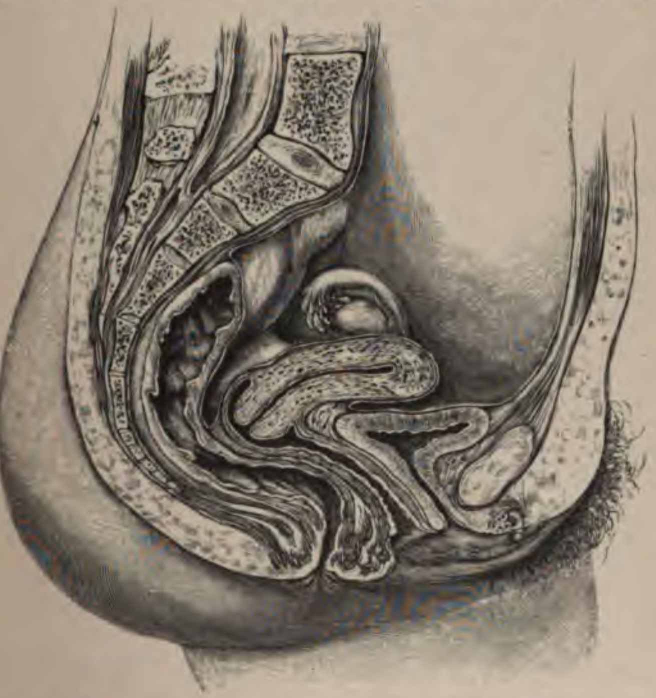


FIG. 1.—SAGITTAL SECTION OF THE FEMALE PELVIS (DICKINSON).

The Uterus (*Womb*).—A pyriform body, consisting mainly of involuntary muscular fibres, and containing a central fissure-like cavity lined with mucous membrane. Superiorly this cavity is continuous with the lumen of each Fallopian tube; inferiorly it communicates with the cervical canal by an orifice known as the internal os. The uterus is divided into three parts, of which two—the body and fundus—project freely into the pelvic cavity, and receive an investment of peritoneum. The fundus is that portion lying above the level of the uterine orifices of the Fallopian tubes; the lower limit of the body is the internal os. The remaining segment of the uterus is the neck or cervix: it invaginates the mucous membrane of the vagina, forming a conical protrusion in this tube. The cervix is traversed by a central passage known as the cervical canal, communicating with the uterine cavity above at the internal os, whilst its lower opening is known as the external os, or commonly the "os uteri."

A fibro-muscular process—the round ligament—projects from each angle of the uterus anterior to the Fallopian tube, and after traversing the inguinal canal is gradually lost in the tissue of the labium majus.

The Vagina.—This is a dilatable mucous canal extending from the vulva to the cervix uteri. The bladder and urethra lie on its anterior wall; posteriorly it rests on the lower segment of the rectum. It receives the penis during copulation. When distended, it is circular in section; when empty, its cavity is represented by a transverse fissure—the anterior and posterior walls lying in apposition. The direction of the vagina is represented in Fig. 1, from which it will be seen that the posterior is longer than the anterior wall by nearly an inch (2 centimetres). The average measurements are 2½ inches (6·2 centimetres) for the anterior, and 3¼ inches (8 centimetres) for the posterior wall. The recess formed by the reflection of the mucous membrane over the anterior aspect of the cervix uteri is known as the anterior vaginal fornix; the recess behind the cervix is the posterior vaginal fornix: it is a deeper cul-de-sac than the anterior. The mucous membrane of the vagina is thrown into numerous transverse folds: on the anterior wall a vertical fold begins behind the urinary meatus and extends upwards for nearly 1 inch (2·5 centimetres). When very distinct, it is called the anterior column of the vagina. A similar fold present on the opposite wall is named the posterior vaginal column. The outer orifice of the vagina is bounded on each side by the levator ani muscle. The orifice can be greatly narrowed by the contraction of these muscles.

The Vulva.—This term is applied collectively to those structures often called the external genitals, and includes: (1) The mons veneris; (2) the labia majora and minora; (3) the clitoris; (4) the hymen.

The Mons Veneris.—This is an eminence formed by a collection of subcutaneous fat situated in front of the symphysis pubis. The skin covering it is in the adult conspicuously furnished with hair, usually of the same colour as that on the head of the individual.

The Labia Majora.—These are two large parallel folds of skin extending from the mons veneris to near the anus. The fissure between the labia—the rima pudendi—is definitely limited posteriorly by a thin cutaneous fold known as the fourchette, which forms a horizontal commissure between the labia, and marks the anterior limit of the perineum. The outer surfaces of the labia are beset with hairs and glands, and are more deeply pigmented than the skin generally. The opposed surfaces of the labia are pink, and possess rudimentary hairs, but very large sebaceous glands. The subcutaneous tissue of the labia contains dartos, fat, and, deeper still, erectile tissue in the form of two oval bodies known as the bulbi vestibuli.

The Labia Minora (*Nymphæ*).—Two thin, pink, cutaneous folds, which though hairless are rich in large sebaceous glands. The nymphæ lie parallel with the greater labia: above they become confluent at the frænum of the clitoris; below they are gradually lost on the inner surfaces of the labia majora.

The Clitoris.—This is a rudimentary penis, but differs from it in not being traversed by the urethra. It arises by a crus from each pubic arch, near the symphysis. The confluent crura form the body of the clitoris, which is held by a suspensory ligament to the front of the symphysis. The extremity ends in a small gland-like body formed of erectile tissue, and peeps from a cutaneous prepuce-like fold which inferiorly forms a median bridle or frænum.

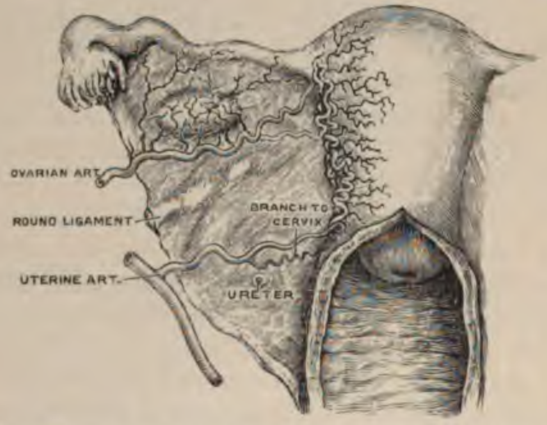


FIG. 2.—DIAGRAM SHOWING THE UTERINE AND OVARIAN ARTERIES.

The Hymen.—A septum of mucous membrane at the junction of the vagina and vulva. When the labia are widely separated the hymen has the appearance of a perforated diaphragm. When the parts lie in their natural position, the hymen forms two folds, and the perforation becomes a fissure;

the edges of the fissure are then the most prominent part of the hymen and lie parallel with, but deeper in the vulvar cleft than, the nymphæ.

When the labia are separated, certain spaces are exposed which receive special names. Of these the most conspicuous is the *vestibule*, an area limited in front by the gland of the clitoris, behind by the margin of the vulvar orifice; laterally it is limited by the converging borders of the nymphæ. The urethra terminates in this space. At the posterior part of the vulvar cleft there is a well-marked depression limited by the hymen and fourchette, known as the fossa navicularis.

The opposed surfaces of the labia, great and small, are kept moist with the secretion furnished by the glands lodged in their cutaneous investment. In addition there are two special structures known as the *glands of Bartholin*, which measure 1 centimetre in width, lodged one on each side near the outer aperture of the vagina, immediately behind the rounded end of the vestibular bulb. The orifice of each duct opens in the recess between the corresponding labium minus and the fold of the hymen.

The Arteries.—1. *The Ovarian Artery.*—This vessel arises on each side from the abdominal aorta below the renal arteries, and runs downward in the subserous tissue to pass between the layers of the mesometrium at the brim of the pelvis; it then makes its way to the side of the uterus near the fundus to inosculate with the uterine artery. In its mesometric course branches are distributed to the ovary, Fallopian tube, fundus of the uterus, and the mesometric connective tissue (Fig. 2). An arterial twig also issues from it to anastomose with a small vessel derived from the deep epigastric artery, which is conducted along the round ligament of the uterus.

2. *The Uterine Artery.*—In a large proportion of cases this artery comes from the hypogastric trunk, a branch of the

anterior division of the internal iliac, which breaks up into superior vesical, inferior vesical, and uterine branches. In other cases the uterine artery arises as a separate branch from the anterior division of the internal iliac. It runs under the pelvic peritoneum toward the cervix; on entering the mesometrium it turns upward and pursues a tortuous course on the side of the uterus nearer the posterior than the anterior surface, and on approaching the fundus inosculates with the ovarian artery. In its course along the uterus it gives many branches which pass across the anterior and posterior wall of the organ to anastomose with corresponding twigs from the opposite artery.

3. *The Vaginal Arteries.*—There are two or three vaginal arteries which arise from the anterior division of each internal iliac artery, or they may be derived from the uterine or middle hæmorrhoidal arteries. They traverse the pelvic connective tissue, and ramify on the walls of the vagina, anastomosing with the vessels of the opposite side.

4. *The Vulvar Arteries.*—The greater and lesser labia are supplied by branches from the superficial and deep external pudics and the superficial and transverse perineal branches of the internal pudic. The clitoris derives its blood-supply from the terminal branches of the internal pudic artery, which arises from the anterior division of the internal iliac. This vessel also gives branches to the skin and the deep tissues of the labia, including the bulbi vestibuli.

The Veins.—1. *Ovarian Veins.*—These are situated mainly in the mesosalpinx, where they form the pampiniform plexus. Near the outer end of the mesosalpinx the veins coalesce and form a single vessel—the ovarian vein—which joins on the right side the inferior vena cava, and on the left side the renal vein.

2. *The Uterine Veins.*—These form a large plexus in each mesometrium; the individual branches are sometimes very

large. From this plexus a single trunk issues to join the internal iliac vein.

3. *The Vaginal Veins.*—These form a plexus around the vagina, from which definite branches issue and accompany the arteries.

4. *The Vulvar Veins.*—These also accompany the corresponding arteries. The superficial external pudic vein terminates in the great saphena vein. The internal pudic ends in the internal iliac vein. The veins from the bulbi vestibuli communicate with the vaginal, pudic and obturator veins.

The Lymphatics.—The lymphatics follow the course of the veins. Thus the lymphatics from the ovaries, the Fallopian tubes, and fundus of the uterus accompany the ovarian veins, and terminate in the lumbar glands. The lymphatics of the round ligament of the uterus join the inguinal glands, whilst those of the lower segment of the body of the uterus and its cervix and the upper two-thirds of the vagina join the iliac glands. The lymphatics of the lower one-third of the vagina and the vulva open into the inguinal glands, but those from the clitoris accompany the internal pudic arteries to the pelvic glands.

The Nerves.—The nerves of the ovaries, Fallopian tubes, and uterus are derived from the sympathetic system, and are conducted to them along the vessels ; branches from the renal plexus are conveyed to the ovaries and tubes by the ovarian arteries, whilst the hypogastric plexus, intermingled with twigs from the third and fourth sacral nerves, supplies the uterus and vagina.

The vulvar structures are supplied by the ilio-inguinal nerve and the long pudendal branch of the small sciatic nerve. A branch of the genito-crural accompanies the round ligament of the uterus into the labium majus. The clitoris is supplied by the internal pudic. This is a comparatively large nerve, and its terminal twigs end in tactile corpuscles. This nerve by its superficial perineal branches also supplies the labium.

The Pelvic Peritoneum.—The pelvic peritoneum in women has a complex disposition, which it is necessary to thoroughly appreciate in order to comprehend the various morbid conditions to which the pelvic organs are liable.

The peritoneum, as it descends from the posterior wall of the abdomen, enters the cavity of the true pelvis and covers the anterior face of the sacrum, the ureters, sacral plexus of nerves, and iliac vessels; it also invests the first part of the rectum, and forms the meso-rectum. It gradually leaves the sides of the second part of the rectum, and, passing on to the upper 2 centimetres of the posterior vaginal wall, extends over the whole of the posterior aspect of the body of the uterus. Continuing, it invests the fundus and anterior surface of the body of the uterus, and leaves it at the level of the internal os to cover the posterior surface of the bladder, and then ascends on the anterior abdominal wall. As the peritoneum invests the uterus, a fold, known as the mesometrium (broad ligament), extends from each side of it, which becomes continuous with the peritoneum investing the iliac fossa. Thus the transverse fold formed by the uterus and its mesometria divides the pelvic cavity into two recesses, of which the posterior is the recto-vaginal fossa (*pouch of Douglas*) and the anterior the utero-vesical fossa. It will be necessary to study these fossæ and the mesometrium in detail.

The Mesometrium.—This important fold is formed by the peritoneum as it is reflected over the uterus and Fallopian tubes; it consists of two layers of serous membrane. The part in relation with the uterus and tubes has the fat of the subserous tissue replaced by unstriped muscle tissue, but as it approaches the floor of the pelvis fat again appears in relation with it. The mesometrium lodges between its layers, in addition to the Fallopian tube, the ovary with the parovarium, Gartner's duct, the ligament of the ovary, the round ligament of the uterus, the ureter, the uterine and ovarian arteries, the pampiniform plexus of veins, the nerves, and the lymphatics of the uterus; these structures are embedded in loose connective tissue. Two strands of muscle tissue, the utero-sacral ligaments, pass from the lateral aspect of the cervix to the sides of the second sacral vertebra.

The upper portion of the mesometrium is called the mesosalpinx; it is included between the Fallopian tube, the tubo-ovarian ligament, the ovary and the ovarian ligament, and contains between its layers the parovarium and the associated segment of Gartner's duct, the ovarian artery and veins, and the uterine end of the round ligament of the uterus.

Accessory Adrenals.—Small rounded bodies, histologically resembling the adrenal, have been detected in relation with the mesometrium in the neighbourhood of the ovary. They have only been observed in fœtuses.

The Recto-vaginal Fossa (*Pouch of Douglas*).—This is a cul-de-sac of the peritoneum in relation with the floor of the pelvis, situated, as its name indicates, between the rectum and the upper 2 centimetres of the posterior vaginal wall and the cervix uteri. Laterally the upper limits of this pouch are the utero-sacral ligaments. The pouch is deeper on the left than the right side, the peritoneum being carried downward by the rectum. When the pouch is not occupied by intestine or omentum, its anterior and posterior walls are in apposition.

The Utero-vesical Fossa.—This is a shallower cul-de-sac between the bladder and the body of the uterus. Its depth varies with the empty or distended condition of the bladder.

The Ovarian Pouch.—This is a shallow recess in the posterior layer of the mesosalpinx. It varies in depth, being small and inconspicuous in many, whilst in others it is deep enough to accommodate the entire ovary. In the virgin the ampulla of the tube falls over the mouth of the pouch and conceals the ovary. This pouch should not be confused with a shallow depression on the lateral aspect of the pelvis near the brim recently described by Waldeyer as the fossa ovarii, which lodges the ovary.

Canal of Nuck.—In addition to the two fossæ actually within the pelvic cavity, there is a peritoneal pouch directly connected with the anterior layer of each mesometrium which partially invests the round ligament of the uterus and accompanies it through the inguinal canal to the labium. This pouch, known as the canal of Nuck, normally becomes obliterated in the adult.

In order that the student may thoroughly comprehend the relations of the pelvic peritoneum it will be useful to summarize briefly the manner in which it invests the parts:

1. *The Ovary.*—This projects from the posterior layer of the mesometrium and strictly has no peritoneal investment.

2. *The Fallopian Tube.*—This is invested on two-thirds of its circumference. The tubal ostium communicates with the cœlom (peritoneal cavity) on the posterior aspect of the mesometrium, below the ovary and near the brim of the pelvis.

3. *The Uterus.*—The peritoneum covers, posteriorly, the whole of the surface of the body and fundus of the uterus and the supravaginal portion of the cervix; anteriorly, the fundus and body to the junction of the body and cervix. The sides of the uterus are in relation with the connective tissue of the mesometrium.

The Round Ligament of the Uterus.—In the pelvis this structure is invested by the anterior layer of the mesometrium. As it traverses the inguinal canal it is accompanied by the invaginated peritoneum which forms the canal of Nuck.

4. *The Vagina.*—The only part of this tube in relation with the peritoneum is the posterior cul-de-sac.

The Ureters.—These ducts enter the pelvis near the point of division of the common iliac arteries—sometimes slightly above, sometimes a little below the point of bifurcation—and dip down the posterior wall to near the ischial spines; from this point, still descending, they pass forward and inward, lying in the connective tissue at the base of the mesometrium, and pass within 1 centimetre of the neck of the uterus; descending along the side and upper part of the vagina, they turn to the middle line, and enter the posterior wall of the bladder. Whilst the ureters are passing from the posterior wall of the pelvis, to gain the side of the neck of the uterus, they are crossed by the uterine arteries.

CHAPTER II

THE GENERAL PHYSIOLOGY OF THE REPRODUCTIVE ORGANS OF WOMEN

THE development, maturity, and decline of the reproductive powers in a healthy woman correspond to the menstrual life, the beginning of which is termed **Puberty,** while its termination is the **Menopause.** This period extends from the age of thirteen to that of forty-eight, with individual variations. Warm climates, sedentary and luxurious habits, and emotional stimulation are associated with early puberty; late puberty is commonly found in the opposite conditions. Puberty is sometimes defined as "reproductive maturity"; but it must be remembered, first, that conception sometimes occurs before menstruation has begun; secondly, that the uterus continues to grow till about the eighteenth or twentieth year, and the woman cannot usually be considered as sexually mature till this time.

The external indications of approaching puberty are: enlargement of the breasts (mammæ), development of hair in the axillæ and on the mons veneris; subjective sensations, such as fulness of the pelvis, backache, and shooting pains in the thighs, and lastly some alteration in the disposition, in the direction of shyness and reserve. The actual establishment of puberty is reckoned from the first menstruation.

MENSTRUATION.

I. **Clinical Features.**—After the first menstruation, which may be rather abundant, it is not unusual for a period of irregularity to succeed; then after some months the process assumes its regular rhythmic form. The periodicity varies with individuals, and in the same individual at different times; most frequently twenty-eight to thirty days elapse between the commencement of one period and the commencement of the next. The total quantity of blood lost at each monthly period varies from 2 to 10 ounces (60 to 300 c.c.), and the flow lasts from two to seven days. Sometimes on the third or fourth day it ceases, to recommence in diminished quantity after twenty-four hours for another two or three days. A discharge of mucus commonly precedes and follows that of blood. The latter has all the characteristics of ordinary venous blood, except that it does not coagulate, owing to admixture with mucus from the cervical canal; it also contains epithelium derived from the uterus and vagina. When abundant, it may be bright red, and clots may form. Under favourable conditions menstruation is painless, especially for the first few years. Later, and in some cases from the first, an aching pain in the sacrum precedes the flow, passing off as this becomes established. Suprapubic pain may either precede or accompany the flow—generally the latter. It is often associated with a dull aching, or with shooting pains in the thighs. In London about 30 per cent. of women continue to menstruate painlessly. The intensity of the pain varies from slight discomfort to intense agony, preventing the woman from getting about or from attending to her ordinary pursuits. No hard-and-fast line can be drawn between normal menstruation and dysmenorrhœa. Similarly, there is great variation in the nature and amount of constitutional disturbance; headache, lassitude, sickness, obscure reflected pains, are not infrequent, with mental depression or irritability; but in some cases there is no disturbance. After child-bearing menstruation usually becomes less painful.

II. Anatomical and Physiological Changes.—A. *Ovulation.*—This signifies the ripening and escape of ova

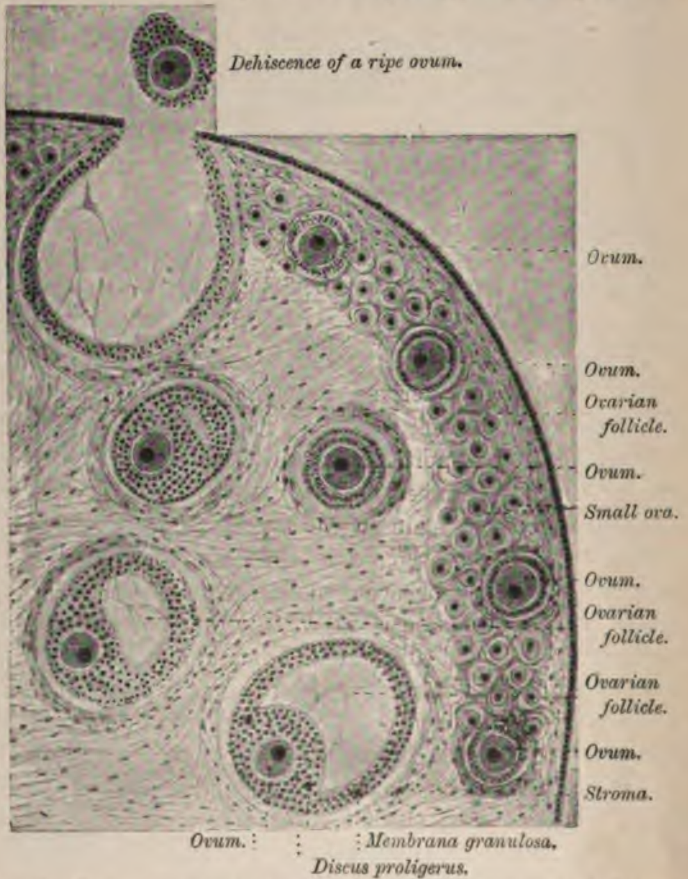


FIG. 3.—DIAGRAM ILLUSTRATING OVULATION: OVARY OF THE RABBIT.

from the ovaries. When these glands (which are the dominan- organs of reproduction in women) fail to develop, sterility results, and the woman generally retains the physical characters of the child. Thus the breasts are small, the pubic hair is scanty or absent, and the pelvis is narrower than usual, whilst menstruation does not occur or is much delayed. With the onset of puberty the ovaries, previously small, enlarge, and exhibit the periodic series of changes known as *ovulation*.

Ovulation consists in the growth and shedding of an **ovum,** which first sinks more deeply into the stroma, and then approaches the surface of the ovary; the follicle in which the ovum is contained bursts, and the ovum itself is discharged. Normally it finds its way into the Fallopian tube, and is propelled along it to the uterus; should the ovum be fertilized, it develops into an embryo. Failing this, it passes out, probably with the menstrual discharges.

The process of ovulation will be readily understood by a reference to the accompanying diagram (Fig. 3) representing its successive stages. From this it will be seen that a given ovum first becomes surrounded by a layer of small cells, to form an **ovarian** (Graafian) **follicle.** At the same time the stroma bounding the follicle becomes denser. On one side of the ovum a line of cleavage occurs in the middle of the surrounding cells, and the space is found to contain fluid. The ovarian follicle now presents an appearance which has been compared to a signet ring; the marginal cells receive the name of **membrana granulosa,** whilst those immediately surrounding the ovum are called the **discus proligerus.** As the follicle grows it approaches the surface of the ovary, and its envelope becomes vascular from enlargement of vessels derived from the stroma. The ripe follicle bulges on the surface; the most prominent point, which is non-vascular, gives way, and the ovum escapes, surrounded by the discus proligerus. This constitutes the **dehiscence** of the ovum. The cavity of the follicle becomes filled with blood, derived from the vessels in its capsule, and the capsule itself contracts in folds. The blood-filled cavity with its convoluted walls is called, from its yellow appearance, the **corpus luteum** (Fig. 4). By degrees the liquid part of the blood is absorbed. The corpus luteum becomes paler and shrinks, and is converted into cicatricial tissue, whose only ultimate trace is a scar or cicatrix on the surface of the ovary. By the repetition of this process, the smooth appearance of the young ovary is replaced by the rugged aspect of the ovary of the adult.

When pregnancy occurs, the corpus luteum, instead of reaching its fullest development in three weeks and disappearing in three months, persists in a well-developed form for three or four months, after which it gradually diminishes, and commonly disappears in two or three months after delivery.

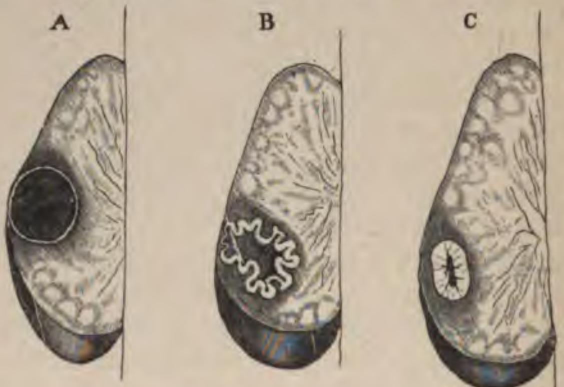


FIG. 4. STAGES IN THE FORMATION OF A CORPUS LUTEUM: A, RECENT BLOOD; B, THE WRINKLING OF ITS WALLS; C, CONTRACTED STAGE.

Probably a certain number of ova fail, on their dehiscence, to enter the Fallopian tube, and are lost in the cœlom (peritoneal cavity). Maturation (ripening) of ova may occur before puberty, and ripe ova have been detected in the ovaries at birth. The view formerly held, that an ovum ripens at each menstrual period, is now abandoned by most authorities. Nor is there any evidence that ovulation occurs alternately in the two ovaries; there is apparently no constant relation in the activity of the two glands.

B. *Changes in the Uterus.*—The only part of the uterus which shows menstrual changes is that between the inner orifices of the Fallopian tubes and the internal os. The Fallopian tubes take no part therein (Bland-Sutton, Heape). The precise nature of the changes, which affect the mucosa alone, has been much disputed. The classical views have been as follows:

(*a*) That the whole thickness of the mucosa, down to the muscular layer, is stripped off and shed at each monthly period (Pouchet, Williams).

(*b*) That the surface epithelium only is cast off (Leopold, Kundrat, and Engelmann).

(*c*) That the mucous membrane remains quite intact (Coste, Moricke).

The difficulty of obtaining specimens of the healthy menstruating uterus has led to this divergence of views. There is, however, reason to believe that in some of the higher apes the process closely resembles that which occurs in women; and, basing our description partly on comparative observations (Bland-Sutton, Heape), and partly on researches on the human uterus, the changes are as follows:

The mucosa of the non-menstruating uterus is composed of a stroma containing numerous glands and bloodvessels, and covered by a single layer of cubical epithelium. Shortly before menstruation begins, the stroma-cells proliferate, and the superficial vessels become dilated; with increased congestion the dilated capillaries break down, and blood is extravasated into the superficial parts of the stroma under the epithelium. Later the epithelium gives way, probably in part from a degenerative change, and is cast off, along with portions of the stroma and of the glandular epithelium. The debris passes out with the menstrual fluid. After a time, regeneration of the mucosal surface takes place, by re-formation of bloodvessels and by the reproduction of epithelium, partly from the torn edges of the glands, and partly by the transformation of stroma elements (Heape).

During menstruation there is a slight spontaneous dilatation of the cervical canal, attaining its maximum on the third and fourth days (Herman).

III. **The Significance of Menstruation.**—We need not refer here to old theories, which are merely of historic interest. The first attempt to explain menstruation from the facts of anatomy and physiology resulted in the *Ovulation Theory*, which supposes that regularly, every month, an ovum ripens and is set free, leading to uterine congestion and menstruation. This theory, which was widely held during the second quarter of last century, through the work of Lee, Négrier, Bischoff, and Raciborsky, is now generally discarded, for repeatedly instances have occurred where menstruation has recently happened and there has been no trace of the ripening of an ovum; and, on the other hand, where ripe follicles and recent corpora lutea are present and menstruation has not been established, or has ceased, or is in abeyance. An explanation has therefore been sought in the periodic variations of nutrition, as shown by the pulse, tempareture, blood-pressure, and the quantity of urea excreted. This is the *Cyclical Theory* (Jacobi, Goodman, Reinl, and others). The existence of the variations is established; but that they are the cause of menstruation, is not.

Probably the simplest way to regard the whole matter is as follows: The female organism presents a tendency to an alternation of nutritive and reproductive activity. The alternation has a monthly rhythm; but to inquire why is as fruitful as to ask why the respiratory rhythm should be about four seconds, or the cardiac cycle something under one second.

The true explanation of menstruation is probably to be sought in comparative physiology. In mammals there occur certain seasons at which the generative organs of the female show signs of special activity, such as swelling of the vulva, coloration or flushing of surrounding parts, and a discharge of blood or mucus from the vagina. This is called the *pro-œstrum* (Heape). It is immediately followed by a period of one to several days' duration, during which alone the female is capable of impregnation, and will receive the male. This "period of desire" is spoken of as the time of "heat," or *œstrus*.

Heape has shown good grounds for regarding the pro-œstrum as homologous with the menstruation of the human female. Now it is clear that the pro-œstrum is a preparation for pregnancy. It would appear that the fertilized ovum cannot become healthily ingrafted save on newly-prepared soil. In the human subject the essential feature of menstruation is not the flow itself, but the series of changes of which the flow is the result and outward expression; and these changes, as we have seen, are of the nature of a reconstruction of the uterine mucosa. We may therefore define menstruation as *a periodic uterine preparation for pregnancy.*

The Menopause.—The onset of the menopause presents very varied features. In some women there is no disturbance at all; menstruation goes on normally, and then simply ceases, without prodromata; this occurs most often among unmarried women. In other cases menstruation becomes irregular in its periodicity, while the quantity becomes variable; after an unusually long interval there is a final and rather profuse flow, and the menopause is established without any constitutional trouble. But in the majority of women "the change of life" is not so easily effected. Various nervous phenomena appear; the patient is subject to hot flushes, attacks of giddiness, obscure pains in breasts, abdomen, and limbs. Digestion is disordered, with flatulence and constipation. There is a great tendency to deposits of fat, which, with the flatulence, may cause "spurious pregnancy," or a phantom tumour. Many women become depressed, and unstable minds may cross the border-line of insanity. It is, therefore, with many, really a "critical period," demanding careful supervision.

The pelvic organs show corresponding anatomical changes. The ovaries become smaller and wrinkled; the vagina contracts and assumes the shape of a cone, at the apex of which is a dimple representing the os uteri—for all the vaginal portion of the cervix atrophies and disappears. The uterine body diminishes in size, and in extreme cases can hardly be felt.

The hair on the mons and labia gradually alters in colour, and is shed. The labia majora atrophy, owing to the disappearance of the subcutaneous fat, and allow the labia minora to project beyond them, and the vulvar orifice is greatly narrowed.

CHAPTER III

METHODS OF EXAMINATION OF THE FEMALE PELVIC ORGANS

Accurate diagnosis is not a matter of intuition. It depends on a scientific interpretation of physical signs and of symptoms.

The value of symptoms is threefold. They determine, first the necessity, and secondly the method of examination; thirdly, they influence the interpretation of signs.

The value of physical signs is that they are of the nature of facts; for their discovery, training and a systematic method are essential. This chapter is concerned with the exposition of a systematic method, whilst the student will obtain his training by the application of the method in the out-patient room and by the bed-side.

Abdominal Examination.—This should always be made first, in the classical order: Inspection, palpation, percussion, auscultation. The patient lies flat on her back, with the knees slightly flexed.

Inspection.—This shows the size of the abdomen, and may reveal striæ, pigmentations, prominence of superficial veins, irregularities of surface, as evidence of past or present distension or of intra-abdominal pressure.

Palpation shows in the first place the resistance of the abdominal walls, and when carried deeper will give information as to the enlargement of particular organs or of certain parts of the abdomen. If there be any abdominal tenderness this is also revealed. It is often necessary to ascertain the condition and relations of the liver, stomach, spleen, and kidneys. Palpation is also most important in pregnancy. In the absence of a tumour occupying the pelvic inlet, the sacral promontory can be easily reached.

Percussion indicates the nature of local or generalized abnormalities discovered by palpation; solid, liquid, or gaseous local conditions may thus be analyzed, and the size and distribution of tumours or of collections of fluid may be ascertained. A loaded colon, often of significance, will sometimes be discovered by this and the preceding method.

Auscultation has also its value, chiefly in pregnancy and in certain uterine tumours (vascular myomata) where a venous murmur may be heard.

In conducting the above inquiries the position of the patient may require to be changed; she may be turned to one or the other side, or the knees may be drawn up in order to relax the abdominal muscles.

Inspection of the external genitals is often unnecessary, at least in the first instance, whilst in other cases it will be indicated by the nature of the symptoms complained of.

Vaginal Examination.—For this purpose the patient may lie on her back or side.

The Dorsal Position.—We take this first because it is the best for a complete pelvic examination. It is often convenient to let the patient retain the position in which the abdominal examination was made, the knees being drawn up.

The right hand is used for the vaginal exploration, and the left for abdominal palpation, the physician sitting at the right side of the patient. Or, if more convenient, the patient is placed at the foot or side of the bed, with knees drawn up and the legs everted, the physician standing or sitting opposite the perineum. In either case the examination is made in the same systematic manner.

The index finger, well lubricated, is introduced into the vagina by gently feeling for the perineum, and passing forward till the posterior margin of the vaginal outlet is reached. In the vagina, the finger should press chiefly against the posterior wall. It must be remembered that the direction of the vagina is towards the body of the first sacral vertebra. After the characters of the vaginal walls and of the cervix have been noted, the left hand is placed on the abdomen, to make the **bimanual examination.** The abdominal wall is depressed just above the pubes, the fingers being placed as flat as possible to avoid hurting the patient with the nails or finger-tips. The position of the pelvic brim must be remembered; for exploration of the posterior regions of the pelvis the hand will have to be placed nearer the umbilicus; similarly, it must be moved to one or other side in examining the lateral parts of the pelvis. As the external hand is moved, the finger in the vagina is moved at the same time, passing into the anterior, posterior, or lateral vaginal fornices, in order to meet the external fingers; and gentle pressure must be made till the inside and outside fingers meet, or till some definite structure is felt between them.

In women who have borne children it is generally better to use two fingers for the vaginal examination, because we can thus reach higher up, and a better idea is obtained of the position of the organs.

Still using the dorsal position, a *recto-abdominal examination* may be required, either in the first instance in virgins or to give additional information in others. Much may be made out by this method: the general size, position, and shape of the uterus can be determined, the posterior surface of the uterus explored, and the appendages often distinctly mapped out.

In certain cases a *recto-vagino-abdominal examination* is resorted to; this is especially useful in defining exudations or solid bodies in the recto-vaginal fossa, for vaginal touch alone might suggest that these were in the rectum, while rectal exploration alone might give the impression that they were in the vagina or connected with the uterus.

The Lateral Position.—The patient lies on the left side, with buttocks projecting over the edge of the bed, and with the knees drawn up. In this position the relation of parts is not so clear, and the beginner will more readily make mistakes. It is well, however, to accustom one's self to both methods, and in certain cases it is useful to employ both in turn. But for some purposes the lateral position answers all requirements, especially when the bimanual examination is not necessary; whilst for some manipulations, both for diagnosis and for treatment, it is preferable.

The lithotomy position, with pelvis raised and knees flexed on the abdomen, is seldom required for an examination, unless under an anæsthetic.

The semi-prone position, or Sims', is useful when it is required to examine, with the speculum or otherwise, the anterior vaginal wall, and sometimes for purposes of treatment. The patient lies on her left side, and partly prone; both knees are drawn up, the right in front of the left. The patient's chest lies almost flat on the pillow, the left arm is placed behind her or hangs over the edge of the bed.

The genu-pectoral position is occasionally required; for instance, to replace a retroverted gravid uterus. The patient rests on her chest, arms, and knees, the pelvis being raised and the thighs vertical.

We have so far traced the methods to be adopted, and the information that may be obtained, in using the hands alone. We must now pass under review the various accessory procedures, with the aid of instruments. Of these, the most important is the uterine sound.

The Uterine Sound.—This should be a rod of copper, silver-plated, rigid enough to retain any shape imparted to it, and flexible enough to admit of being bent with the fingers. It is set on a handle which is flattened, and rough on one surface (Fig. 5). The sound is straight in the portion next the handle; the distal portion is curved, the concavity being on the same side as the rough surface of the handle. The curve is of such a nature that the last 2½ inches (6·2 centimetres) form an angle of about 140° with the straight portion; and at the junction of these two parts there is a well-marked knob or angle on the convex side, which can be readily distinguished by the finger, and which marks the distance to which the sound should enter a normal uterus. The instrument is graduated by means of notches on the convex side. The first notch is 1½ inches (3·7 centimetres) from the tip; the knob or angle forms the next mark, 2½ inches (6·2 centimetres) from the tip, and the remaining notches are 1 inch (2·5 centimetres) apart; the first being 3½ inches (8·7 centimetres) from the tip. The length of the uterine canal is easily measured by placing the finger on the point just outside the

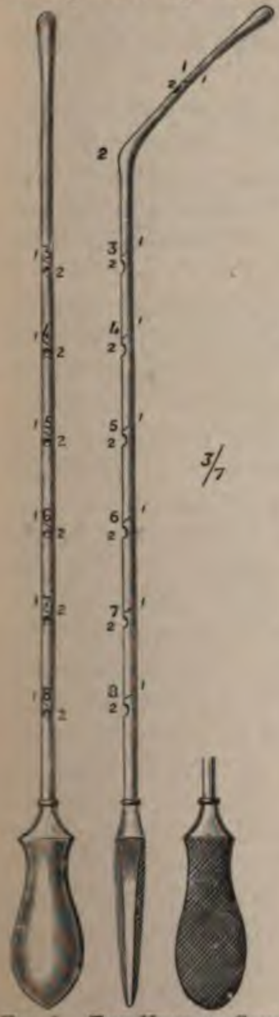


FIG. 5.—THE UTERINE SOUND.

external os when the sound has passed as far as it will, and keeping the finger in its place while the sound is being withdrawn. The distance is read off by means of the graduation notches.

The sound should not be used when the patient has missed a menstrual period, unless pregnancy be certainly excluded; when there is any pelvic inflammation, malignant disease of the uterus, or when the vagina or cervix is septic. All these points can be determined by the preliminary digital examinations.

How to Use the Sound.—It is most important that the position and direction of the uterus should be first determined, for facility in passing the sound depends almost entirely on knowing the direction it must take. This settled, the index finger of the right hand (with the patient in the ordinary left lateral position) is placed so as to rest against the os, and the point of the sound is carried along the concavity of the finger and guided by it into the cervical canal. Once entered (a matter of little difficulty, as a rule), the handle of the sound is to be carried gently back to the perineum. In most cases this will suffice to cause the end of the sound to slip through the os internum. No pressure need be used. If the uterus is retroverted the concavity of the sound should first be directed backward, and by moving the handle slightly forward the sound enters the cavity. When the uterus is retroflexed as well as retroverted, the sound should be held with its concavity forwards until its point reaches the internal os; the handle should then be carried back with a semicircular sweep, after which it is carried forward in a straight line till the point passes into the uterine cavity. In some cases, when there is lateral deviation of the uterus, or when the canal is tortuous (as when a myoma is present), a little patience and care will be needed. But always desist rather than use force. The introduction of the sound is sometimes facilitated by taking hold of the anterior lip of the cervix with a volsella, and drawing it gently down.

Information Given by the Sound.—It is possible to introduce and withdraw a sound, and to realize little but the fact of its introduction; but, used as an extended, sensitive finger, it will teach much. At the outset the degree of patency of the os will be noted, the smoothness or otherwise of the cervical canal, and the existence (if present) of muscular spasm at the os internum; one gets also a general idea of the firmness or flabbiness of the tube through which the sound is passing. The sound once introduced, the position of the fundus is recognised, when this could not be ascertained by the bimanual examination, the length of the cavity can be measured, and by gentle rotatory movement its width may be gauged. Projections may be met with, as sessile tumours, which at first obstruct the passage of the sound. Sometimes, also, two distinct directions will be found in which the sound passes, as in a bipartite uterus. Meanwhile the patient will herself have given some indications; at certain points she may complain of pain, as in passing through the internal os, or when touching the fundus. If the bimanual examination has revealed a tumour, it will now be noted whether the sound passes into it or not, and in the latter case whether movements of the sound are at once conveyed to the tumour or *vice versâ;* in this way a uterine can often be distinguished from a non-uterine tumour. When the tumour is uterine, by placing one finger in the anterior and the other in the posterior fornix, or with one finger in each lateral fornix, it may be possible to determine whether the tumour is in the anterior, posterior, or side wall of the uterus.

As the sound is withdrawn, it may be felt to be gripped, either by spasm or by mere narrowness of the passage; we have here the test of stenosis. If, while the sound is introduced as far as possible, the finger be placed on it up against the cervix, and it be kept in this position when the sound is withdrawn, the length of the cavity can be exactly read off.

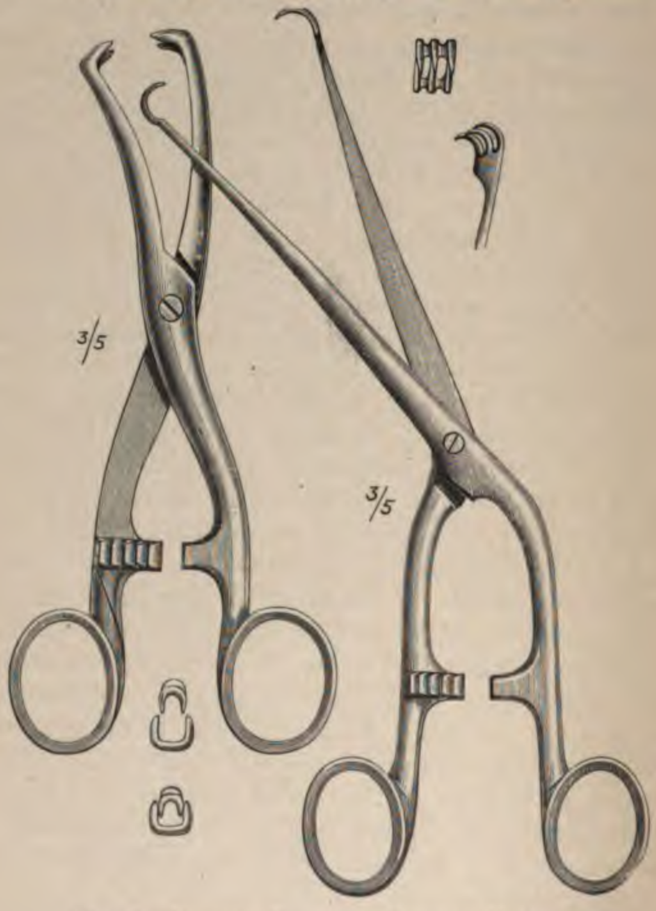


FIG. 6.—BULLDOG VOLSELLA; SLENDER VOLSELLA.

Lastly, we look at the sound, to see if its introduction has caused bleeding.

The Volsella.—This is principally an instrument for treatment, but may be required also for diagnosis. It is used to draw the cervix down, and is generally applied to the anterior lip. In most cases an antero-posterior grasp of the anterior lip is obtained; but in nulliparæ with a small cervix it is often more convenient to seize the lip transversely. When the uterine canal is bent, traction on the cervix tends to straighten it, and thus facilitates the introduction of the sound. The ordinary volsella (Fig. 6) is slender, with thin hooks; for obtaining a firm hold, as when the uterine canal is being dilated, the bulldog volsella (Fenton's) is a very convenient instrument (Fig. 6).

In removing a volsella, care is required lest the vagina be caught and torn.

The Speculum.—Introduced as an instrument of diagnosis, the speculum has now become an appliance for treatment. There is very little that a speculum shows that cannot be discovered by touch; but it is sometimes desirable to see the condition of the vagina and the cervix. The simplest is the *cylindrical* or *Fergusson's speculum* (Fig. 7). This is usually a hollow cylinder of stout glass, silvered like a mirror and coated with vulcanite. Its extremity is bevelled, and is very liable to chip. When this happens, it will scratch the patient and cause pain. This drawback is avoided by using specula made of metal or celluloid. To introduce it, the instrument is warmed and lubricated with oil or vaseline, and the perineum is held backward while the end of the speculum is pressed against it. The instrument is gently pushed in the direction of the vaginal axis. If care be taken to avoid pressure anteriorly against the pubes, and if a suitable size be chosen, the procedure causes no pain. As the speculum passes up, a general view is obtained of the vaginal walls, and finally the cervix comes into view. A small swab of cotton-wool should be at hand to clear away the mucus and blood (if any) from the surface of the cervix; this can then be examined with ease.

Sims' speculum (Fig. 8) can be used only in the semi-prone or the lithotomy position, and requires an assistant to hold it. By its means a good view can be obtained of the anterior vaginal wall and of the cervix.

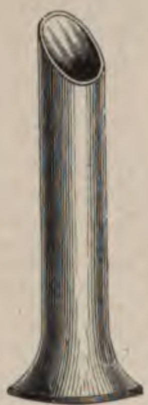


FIG. 7.—FERGUSSON'S SPECULUM.

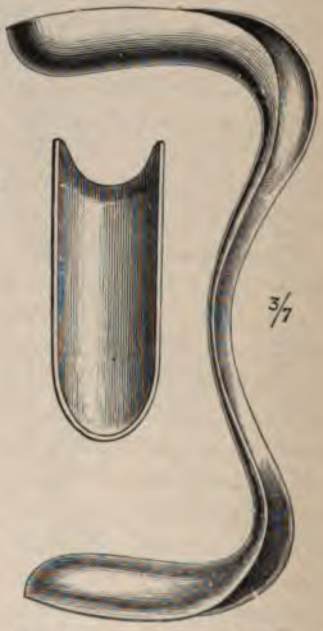


FIG 8.—THE DUCKBILL (SIMS') SPECULUM.

The bivalve (*Cusco's*) *speculum* is easy to introduce, and allows of considerable separation of the two free ends, whilst the part embraced by the vulvar outlet is not further distended. A good view of the vaginal walls may be obtained by slightly rotating the instrument. It has the disadvantage of complexity of screw and hinges, making it a matter of difficulty to keep it perfectly clean.

Neugebauer's speculum is one of the most generally convenient. The larger posterior blade is first introduced, well lubricated; the smaller blade lies within the larger, the two together forming a cylinder where they touch. Any degree of separation of the inner ends of the speculum can be obtained that may be desired; a good view of the cervix can be obtained, and by using one blade alone the anterior or posterior vaginal wall can be explored.

It is sometimes necessary to include in one's examination the digital exploration of the interior of the uterus. Except immediately or soon after confinement or miscarriage, or when the cervix is dilated by a tumour (polypus), this can only be done under an anæsthetic, and the cervical canal must be dilated. Tents were formerly used for this purpose, but they are always tedious and often unsafe, and except in special circumstances it is better to carry out dilatation at one sitting.

Examination under an Anæsthetic.—We would lay special stress on the importance of this as an aid to exact diagnosis. In the case of unmarried girls and nulliparous women with narrow vagina it is especially indicated; partly, in the former case, for ethical reasons. That it may be satisfactory, the rectum should be first emptied by means of an enema, and the urine drawn off, if necessary, by catheter.

The first advantage is the avoidance of pain; as a consequence the examination can be much more thorough, and deep pressure exerted as required. In the second place, the muscular relaxation allows of a much better bimanual examination. There should be no difficulty, in an ordinary case, in exactly mapping out the position of the uterus, ovaries, and tubes. The differential diagnosis of pelvic conditions from one another and from renal and other abdominal tumours is comparatively easy.

Small pelvic swellings are often easily overlooked in an ordinary examination; whilst an examination under an anæsthetic in the lithotomy position will generally reveal them without trouble. In addition, the bladder and rectum can, if necessary, be thoroughly explored.

CHAPTER IV

MALFORMATIONS OF THE REPRODUCTIVE ORGANS OF WOMEN—DEVELOPMENT OF THE GENITAL ORGANS

IN order to understand the malformations to which the female generative organs are liable, some knowledge of the mode of development of these organs is necessary.

Men and women are distinguished from each other by two sets of sexual characters, primary and secondary.

Primary Sexual Characters.—These are directly concerned in the function of reproduction. In a man they include the penis, the testes, with the vasa deferentia, the prostate, and Cowper's glands. In a woman they consist of the vagina, the ovaries, Fallopian tubes, and the uterus.

Secondary Sexual Characters.—These comprise those features which enable the male to be distinguished from the female, irrespective of the organs of reproduction and those used for the nourishment or protection of the young.

The characters belonging to this group, so far as the human family is concerned, are exclusively in possession of the male. Man is distinguished from woman not only in the possession of a beard and greater muscular development, with its necessary accompaniment, greater physical strength, but he has a more powerful voice, and the skin of his trunk and limbs is thick, and more abundantly supplied with coarse hair, which has a somewhat different disposition in woman. In man the front of the chest is usually covered with hair, and that on the pubes passes upward to the umbilicus, whereas in the female it is restricted to the mons veneris. A less constant feature, but one which seems confined to men, is a luxuriant growth of hair on the prominence of the pinna known as the tragus.

Secondary sexual characters are not present in the young, but become manifest at puberty, by which term we signify reproductive maturity. At this period the generative organs increase in size, and in the male become functionally active. In the female, puberty is more strikingly declared by the institution of menstruation.

Until the advent of puberty, the boy, so far as secondary sexual characters are concerned, resembles the female as much as he does the male, but after that period he begins to assume those of the male.

The development of the primary sexual characters, or reproductive organs, is as follows:

The early embryo possesses in a potential form the primary sexual organs of both sexes, and at an early stage in its development—namely, up till the end of the eighth week of fœtal life—it would be impossible to determine its sex (Fig. 9). In this undifferentiated stage the future reproductive organs are represented by two glandular masses, which ultimately become the genital glands (ovary or testis). They arise as a thickening of the peritoneum in the lumbar region, and associated with them is a remarkable temporary organ known as the mesonephros (Wolffian body), furnished with a series of tubules—the mesonephric (Wolffian) tubules, opening into a duct—the mesonephric (Wolffian) duct, which terminates in a recess known as the urogenital sinus, formed by a depression of the surface opposite the end of the hind-gut. In addition to the ducts just mentioned, there is another pair known as the pronephric, or Müller's ducts, which are peculiar inasmuch as they open anteriorly into the cœlom (pleuroperitoneal cavity). They run parallel with the mesonephric ducts, and open into the urogenital sinus. In front of this sinus is a prominence, the genital eminence, prolonged backwards as a fold of skin on each side of the urogenital sinus, and destined to form the external organs.

In the female (Fig. 10), the genital masses become ovaries.

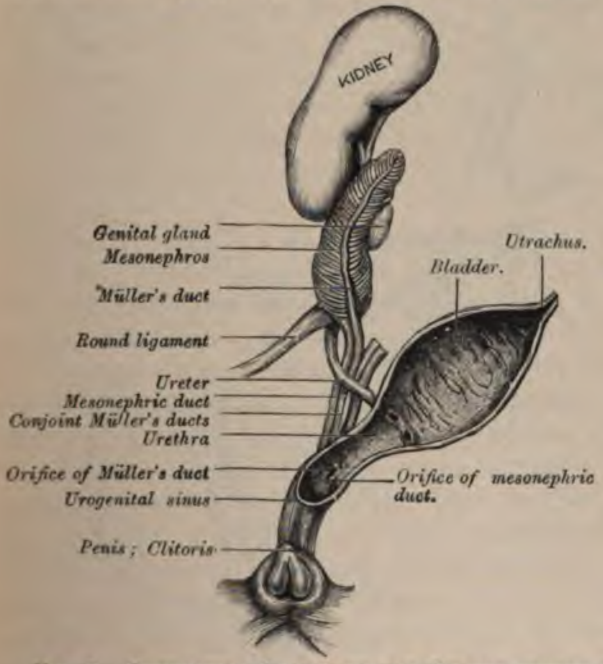


FIG. 9.—GENERATIVE ORGANS OF THE EMBRYO BEFORE THE DIFFERENTIATION OF SEX (HENLE).

From the eighth to the twelfth week important changes occur. The Müllerian ducts coalesce from below upwards, forming the vagina (which opens into the urogenital sinus), and the uterus. For some time the uterine horns remain distinct, the demarcation between each horn and its corresponding Fallopian tube being indicated by the insertion of the round ligament. The Wolffian ducts atrophy, and finally disappear, except for some vestigial traces still found in the adult (see table, p. 41). The communication between the hind-gut and the outside is effected, forming a cloaca, which,

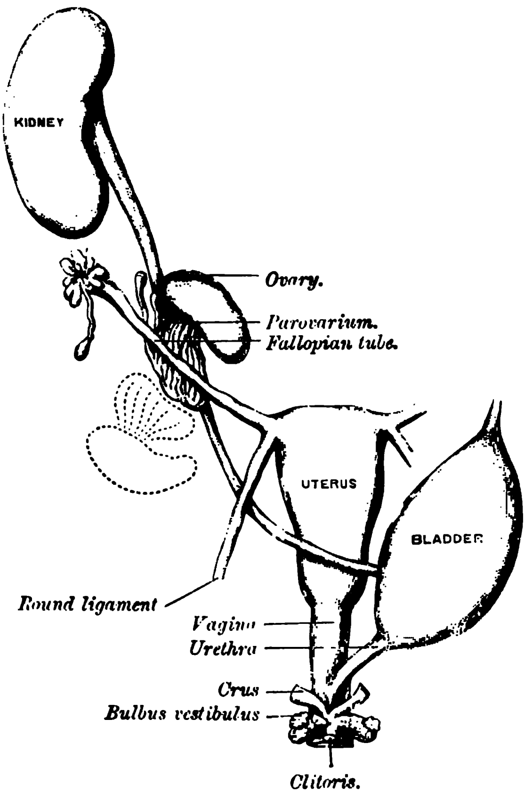


FIG. 10.—GENERATIVE ORGANS OF THE FEMALE (HENLE).

by the downgrowth of the perineum, becomes divided into urogenital opening and anus.

From the twelfth to the twentieth week the female characters become more marked. The uterine horns become fused to form an undivided uterus; the cervix, with its arbor vitæ, is indicated; and the urethral and vaginal orifices become separated. The genital eminence becomes relatively smaller, forming the clitoris; the folds which pass backwards from it become the labia minora, and within the vestibule between them the hymen forms round the vaginal orifice. From the twentieth week to the end of fœtal life the fundus of the uterus increases in size, though it does not keep pace with the growth of the cervix. Folds form in the vagina and cervix, and the labia majora are indicated by the deposition of fat in two folds outside and parallel with the labia minora.

In the male (Fig. 11) the genital masses become testicles, the mesonephric tubules and ducts develop and become vasa efferentia. The main duct on each side is known as the vas deferens, which ultimately opens in the floor of the urethra, the adjacent parts of which become excessively developed and form a musculo-glandular organ, the prostate. Coincident with the growth of the mesonephric tubules and ducts the glandular part of the mesonephros atrophies, and its vestiges are incorporated with the testis, and lie between the body of the testis and its globus major, closely associated with the vasa efferentia. Usually the Müllerian ducts atrophy except at their extremities, the lower of which fuse to form a sinus in relation with the prostatic urethra—the sinus pocularis—the anterior extremity being probably represented by a pedunculated body, the cyst of Morgagni.

Further fusion and development take place externally. The parts which in the female persist as the labia majora fuse together and form the scrotum, and at the same time the anterior prominence enlarges and becomes the penis; the lateral folds corresponding to the labia minora fuse in the median line to form a canal, known as the membranous and penile urethra, along its lower border. Finally, the testicles descend from the lumbar region into the false pelvis; then, preceded by a pouch of peritoneum, traverse the abdominal wall, and finally occupy permanently the scrotum.

Thus a study of the developmental history of the genital organs enables us to prove that the female possesses vestiges of male organs, whilst the chief female organs are represented in the male. The relation of the adult organs in the male and female, and their common derivation from the same fœtal structures, are indicated in the following table, the parts shown in italics being rudimentary or vestigial in the adult.

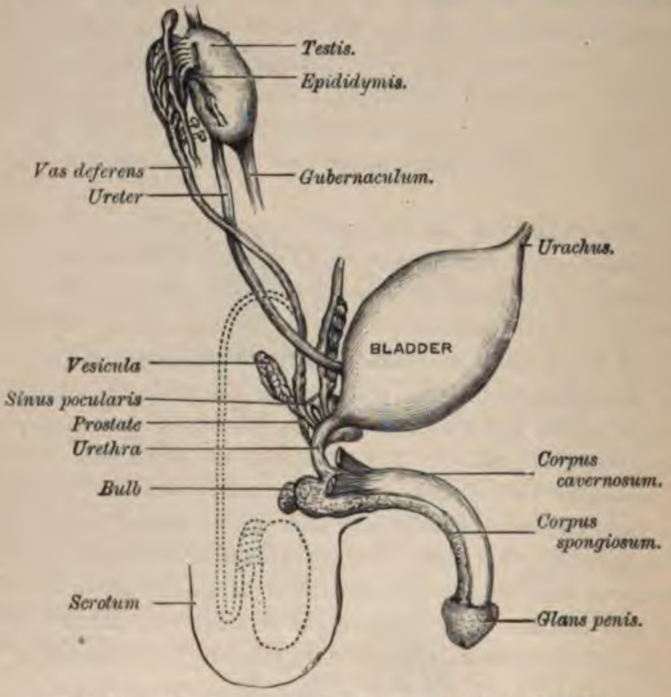


FIG. 11.—GENERATIVE ORGANS OF THE MALE (HENLE).

A TABLE OF HOMOLOGOUS PARTS IN THE MALE AND FEMALE.

Adult Male.	*Fœtal Structures.*	*Adult Female.*
Body of Testis	Genital gland	Oöphoron
Paradidymis	Wolffian body	Paroöphoron
Vasa efferentia		*Parovarium* (*epoöphoron*)
Vas deferens	Wolffian duct	*Duct of Gartner*
? *Cyst of Morgagni* ...	Müllerian duct	Fallopian tube
—		Uterus
Sinus pocularis		Vagina
Glans penis and corpus spongiosum	Genital eminence	Glans clitoridis and vestibular bulbs
Corpora cavernosa (penis)		Corpora cavernosa (clitoridis)
Prostatic urethra ...	Genital folds bounding urogenital sinus	Urethra
Membranous and penile urethra		Vestibule and labia minora
Folds at entrance to sinus pocularis		Hymen
Cowper's glands		Bartholin's glands
Scrotum	Outer portion of genital folds	Labia majora

CHAPTER V

MALFORMATIONS OF THE REPRODUCTIVE ORGANS OF WOMEN—(*Continued*)

From a consideration of the facts of development, as we have briefly outlined them, it will be readily understood that malformations may occur in one of four principal ways, with minor variations, as tabulated in the following scheme.

I. Malformations by arrest of development:
  - (*a*) Total arrest, or suppression of organs.
  - (*b*) Partial arrest, or under-development.

II. Malformations by persistence of septa:
  - (*a*) Persistence of longitudinal septa — double uterus and vagina.
  - (*b*) Persistence of transverse septa—atresia of the genital passages.
  - (*c*) Persistence of longitudinal and transverse septa— unilateral atresia.

III. Malformations by excess of development:
  - Accessory organs or ostia.

IV. Malformations by combination of male and female characteristics:
  - Pseudo-hermaphrodism.

We shall describe the malformations of the genital organs in the order indicated.

I. ARREST OF DEVELOPMENT.

(*a*) **Total arrest, or suppression.**—*Absence of the genital organs* is found only in the case of gross monstrosities, such as the *fœtus amorphus* and *acardiacus*, and is therefore very rare.

Absence of the vulva is also a very rare condition. The labia minora or majora may be absent, but even then some trace of the clitoris is nearly always found. The internal organs in such cases are generally under-developed.

Absence of the vagina sometimes occurs. The interval between cervix and vulva is then occupied by a fibrous thickening or cord-like band, which is all that remains of the vagina. The urethra comes to lie nearer to the anterior rectal wall, as in the male.

Absence of the uterus occurs even when a vagina is present, but we believe that such a condition is found only in the case of pseudo-hermaphrodites, when testes are present instead of ovaries. When ovaries are present, some trace of the uterus, however small, is usually found on dissection. Clinically, it is very difficult in many cases to determine whether the uterus is absent or not. The same remark applies to *absence of one or both ovaries or tubes*. The ovaries are absent only in the case of pseudo-hermaphrodites, where they are replaced by testes.

Absence of the anterior or posterior wall of the urethra may occur, producing the conditions known respectively as epispadias and hypospadias.

(*b*) **Partial arrest of development, or under-development.**—*Under-development of the whole genital organs* is not very rare, and all grades are found, corresponding with arrest of growth at various stages from birth to puberty.

Under-development of the Vulva.—Individual portions may be concerned, such as the clitoris, labia minora or labia majora. In the condition known as exstrophy of the bladder (Fig. 23), in which the abdominal wall from the umbilicus to the urogenital sinus fails to unite, the clitoris is usually bifid and rudimentary, and the labia minora are also small. Or the whole vulva may be small and infantile.

Under-development of the Vagina.—The vagina may be shorter or narrower than the normal. A short vagina, which affords a clear passage from the cervix to the outside, must be distinguished from the vagina of which a portion has failed to develop. Narrowing or stenosis of the vagina may be due to simple under-development, or to non-fusion of the lower part of the Müllerian ducts and obliteration of one of them, or to non-development of one half. This may occur in association with a single-horned uterus.

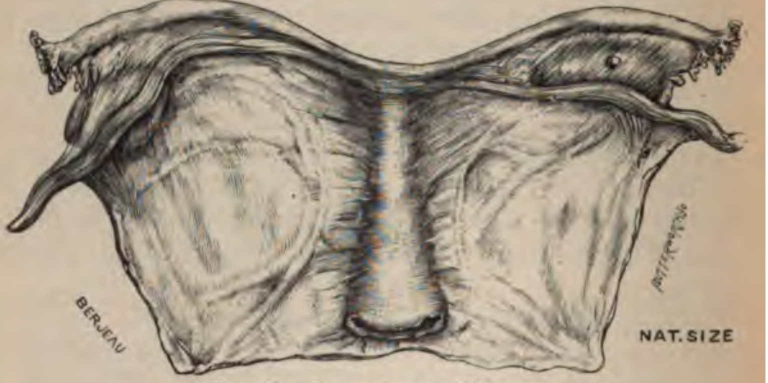


FIG. 12.—RUDIMENTARY UTERUS.

Partial absence of the vagina is considered under atresia of the genital passages.

Under-development of the Uterus.—This may be present in one of two degrees:

1. *Rudimentary Uterus.*—The uterus may be represented only by a little knob surmounting the vagina. From incomplete examination such cases have been described as absence of the uterus. Or the cervix may be fairly well marked, whilst the body is very narrow, and the Fallopian tubes meet

at the fundus (Fig. 12). The ovaries are small, and other important malformations usually coexist, or there is general arrest of development, the woman of twenty-five presenting the physical and mental characteristics of the child. Menstruation is absent, and the secondary sexual characters, such as the breasts and pubic hair, are developed late or not at all.

2. *Infantile Uterus.* — The uterus preserves the type which it presents normally at birth. The whole organ is narrow in proportion to its length, and the cervix is long in proportion to the body. The external os is small (pinhole os), and the cervix conical (Fig. 13). (Figs. 14 and 15 are introduced for comparison with the conical cervix). Acute anteflexion frequently coexists. The vulva, vagina, pubes, and breasts may share in the retardation; but in some cases they do not differ from the normal adult condition. Menstruation seldom occurs in the more marked types; in the lesser degrees it comes on late and

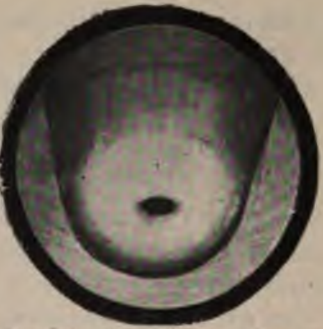


Fig. 13.—The Conical Cervix as seen in a Speculum.

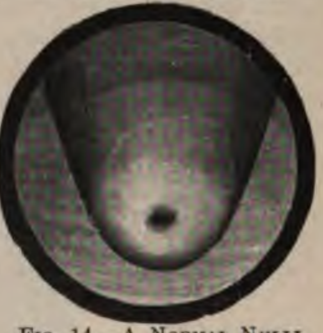


Fig. 14.—A Normal Nulliparous Cervix.

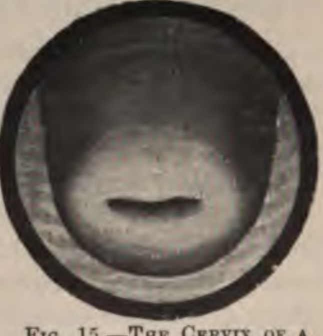


Fig. 15.—The Cervix of a Parous Woman.

is scanty and irregular. Sexual desire is usually absent, and the patient is sterile.

Single-horned uterus (*Uterus unicornis*).—If one half of the uterus develops normally, whilst the other retains its fœtal condition, the condition known as uterus unicornis results (Fig. 16). The round ligament marks the limit between the rudimentary horn and its Fallopian tube. Both ovaries may be well developed, but as a rule the one associated with the rudimentary horn retains its infantile shape. The vagina is often narrow, and the uterine cavity small. Nevertheless, no symptoms may be present, and the woman may menstruate, have sexual intercourse, and become pregnant, just as in the normal condition. But if the pregnancy occur in the rudimentary horn, it practically takes the course of a tubal gestation, resulting in rupture.

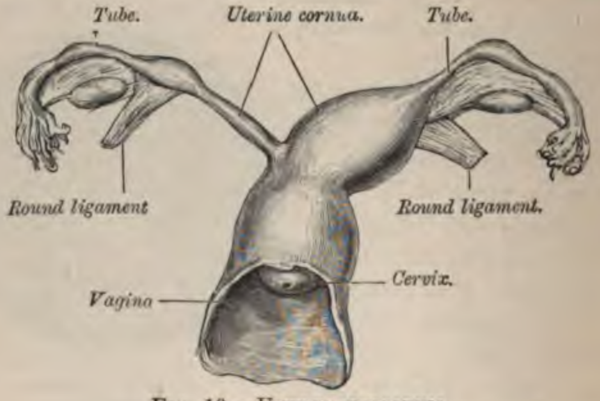


FIG. 16.—UTERUS UNICORNIS.

Rudimentary Fallopian Tubes.—One or both tubes may remain under-developed. Sometimes this is the result of fœtal peritonitis. In rare cases, of which we have seen an example, the tubes become occluded along their course, and divided. The fimbriated end shrivels up, and the remainder of the tube attains a striking resemblance to a vermiform appendix. In other cases the fimbriæ remain well-developed, whilst the portion of tube nearer to the uterus atrophies to a cord-like structure.

Rudimentary ovaries usually present the long narrow shape characteristic of fœtal life. This form is seen not infrequently in cases of undescended ovary and of congenital hernia of the ovary. In other cases the ovary is small, but of normal shape. Menstruation and sexual desire may be absent, and in any case sterility results.

As the result of arrest in the development of the cloaca and urogenital sinus, several rare malformations occur. Thus the anus may be imperforate terminally, the rectum opening into the posterior vaginal wall, or the vagina may be imperforate below, but open into the anterior wall of the rectum. The urethra may be absent, the bladder opening into the vagina. There is an example in the museum of the London Hospital of rectum and bladder both opening into the vagina, the orifice of which thus served as a general cloaca. There was apparently no suspicion of the state of things till the patient was ordered an enema in the hospital.

II. MALFORMATIONS DUE TO THE PERSISTENCE OF SEPTA.

Either a longitudinal or a transverse septum may persist, or there may be a combination of both conditions, and three types of malformation are thereby produced:

(*a*) Double uterus and vagina, from failure of coalescence of the two Müllerian ducts.

(*b*) Atresia of the genital canal, from failure on the part of the coalesced Müllerian ducts to open into the urogenital sinus.

(*c*) Doubling of the uterus and vagina, with atresia in one half—that is, unilateral atresia.

(*a*) **Double Uterus and Vagina.**—Inasmuch as the fusion of the Müllerian ducts occurs from below upwards, it is not uncommon to find a double uterus with one vagina, or a double fundus with a common cervix and vagina; but the reverse condition—that is, a double vagina with undivided uterus, or a double cervix with undivided fundus—is never found.

Double Vagina.—This occurs in some cases of double uterus. The septum between the two halves of the vagina may extend to the vulva, when the appearance of the vaginal orifices somewhat resembles a double-barrelled gun. Or the orifice may be single, and the septum, or portions of it, may be discovered only on making a digital examination. It may give rise to no symptoms, even after marriage; but the septum may be torn through during either coitus or childbirth, and its remains appear as median longitudinal ridges on the anterior and posterior vaginal walls. In other cases one half is enlarged by sexual intercourse, and pregnancy occurs in the corresponding half of the uterus.

Double Uterus.—Three types are found: the uterus septus, the uterus bicornis, and the uterus didelphys. In the first two the cervix may be single or double; the uterus didelphys has necessarily two cervices.

1. In the **uterus septus** the ducts have fused externally, but the septum formed by their approximation persists; consequently the uterus, seen from the outside, appears normal. On section it is found to contain two distinct cavities. The septum may extend to the vulva, producing a vagina with the appearance of a double-barrelled gun; or it may involve the uterus alone, the vagina being single; or it may fail to reach the external os, in which case the cervix looks normal when seen through a speculum. The last kind is the *uterus subseptus*.

2. In the **uterus bicornis** (Fig. 17) external union has

occurred in the lower part of the uterine body, but is wanting in the upper part; so that when such a case is bimanually examined, the depression between the two halves of the fundus is plainly felt. Here also the extent of the septum varies, reaching to the vulva, to the os externum, or to the os internum only. The last kind gives the variety known as *uterus bicornis unicollis*.

3. In **uterus didelphys** (Fig. 18) the two halves of the uterus have remained externally distinct, and can be moved independently of one another. The vagina is invariably double, the two halves being united by connective tissue, and a loose bridge of connective tissue and peritoneum stretches between the cervices. A well-marked fold of peritoneum usually stretches directly between the bladder and rectum, passing between the two halves of the uterus.

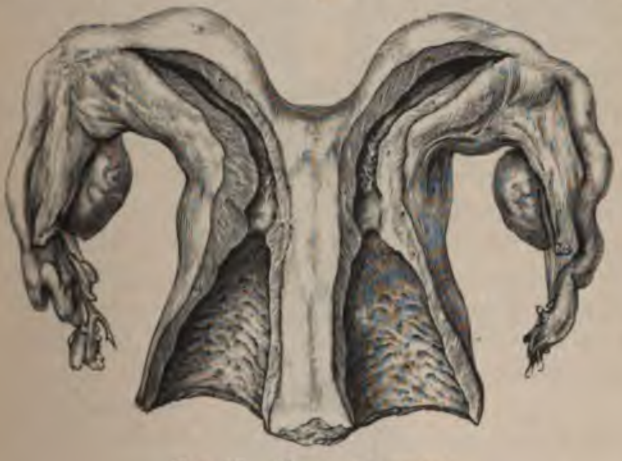


FIG. 17.—UTERUS BICORNIS.

Each uterus has its own Fallopian tube, whose point of junction with the uterine body is indicated by the origin of the round ligament; it has also its own ovary.

The two halves are often unequally developed, and one vagina may end blindly above the vulva, so that the corresponding uterus is quite shut off from the outside.

Diagnosis.—The presence of two vaginal canals is a certain indication that the uterus is double. Where the vagina is single, the malformation of the uterus may be discovered in one of several ways. Thus, when the division involves the cervix, two ora externa may be seen through the speculum; on bimanual examination two separate uterine cornua may be felt, with a depression between. The condition may be suspected from the passage of the sound in two different

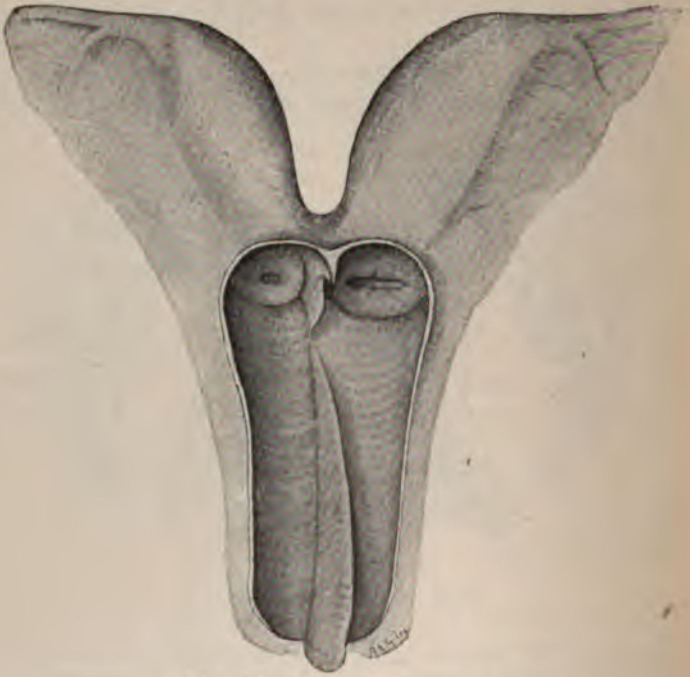


FIG. 18.—UTERUS DIDELPHYS.

directions; when one half has become occluded, with retention of menstrual blood, the opening of the fluctuating tumour may reveal the presence of the second canal; lastly, some complication during delivery may lead to diagnosis.

A careful examination is required to distinguish the variety of double uterus. If bimanually the fundus feels normal in shape, whilst two cervical openings are present, and two sounds can be simultaneously introduced without coming in contact inside the uterus, the case is one of uterus septus. If a well-marked central depression exists, we have to deal with uterus bicornis or uterus didelphys. If the cervix be single, it is a two-horned uterus. If it be double, the following points will serve to distinguish the two. In the case of the uterus bicornis the two halves are closely adherent usually for some distance above the level of the internal os; and they cannot be moved independently. In the case of the uterus didelphys, the two halves can be so moved; indeed, one may be found lying in front of, or at some distance from, the other; and, further, the separation down to the level of the external os can be distinctly felt by recto-abdominal examination.

In both cases the points of two sounds simultaneously introduced may diverge widely, pointing perhaps to the respective iliac crests, while the handles cross each other in the vagina at right angles.

As a rule, each horn or each half-uterus can be felt to have attached to it its own Fallopian tube and ovary.

Complications.—One half of a double uterus may be occluded at the cervix, or there may be atresia of the corresponding vagina, in which case the symptoms of hæmatometra arise. Otherwise a double uterus may give rise to no symptoms at all, and several pregnancies may be passed without the condition being suspected. In other cases some complication arises during delivery, leading to discovery of the condition; but considerable perplexity may be caused at first. Thus in some cases an obstetrician has on examination found a wide vagina and dilating cervix; a later examination, in which the finger has inadvertently entered the second vagina, has revealed a narrow vagina and a closed os.

The following are the clinical complications to which a double uterus may give rise:

1. Unilateral atresia, with retained menstrual products.
2. Dyspareunia.
3. Double vaginitis or endometritis, treated unsuccessfully by applications to one side only.
4. Obstruction to delivery by a displaced empty half.
5. Obstruction due to the vaginal septum.
6. Retained and undiscovered products of conception in one half in cases of double pregnancy.

The two halves of a double uterus may independently menstruate. When pregnancy occurs in one half, a decidua forms in the other half.

(*b*) **Atresia of the Genital Canal.**—Congenital atresia only affects the vagina. An acquired atresia of the os externum or internum may be present, but it is not strictly a malformation. We shall, however, consider all kinds of atresia when discussing the clinical significance of malformations.

Vaginal atresia is of various grades; in the simplest form a thin septum is present, occluding the vaginal orifice. This was formerly called atresia of the hymen; but the septum is vaginal, and the hymen can be distinguished adherent to the margin of its external surface. It must be remembered that the hymen does not, at any stage of its development, form a complete septum; it arises as a membranous fold from the margins of the urogenital sinus.

Vaginal atresia may be due, not merely to the presence of a thin septum, but to the fact that its lower end fails altogether to reach the surface; thus the lower third, half, or the whole vagina may be absent. There is generally, however, some portion of unoccluded vagina just below the cervix. Absence of the middle part of the vagina with persistence of its uterine and vulvar extremities has been described; but we believe that the interpretation of the external cul-de-sac found in such cases is this: when the lower two-thirds of the vagina are wanting, the apex or lower end of the patent portion is connected with the vestibule by a fibrous cord, which fails to elongate as the pelvis grows, with the result that the vestibule is drawn up in the form of a cul-de-sac resembling the lower part of the vagina. It is very doubtful if an intermediate portion in the continuity of the vagina is ever suppressed.

On careful examination of the uterus in the fœtus at birth its cavity will be found to contain mucus, sometimes sufficiently abundant to dilate it. In cases of congenital atresia of the vagina this canal has been found dilated into a large cyst, its lower end bulging beyond the vulva, and so compressing the urethra as to cause retention in the new-born child. Thus in the specimen represented in Figs. 19 and 20 the pressure of the distended vagina had not only compressed the urethra, but had interfered with the ureters, and produced dilatation of the renal pelvis and its infundibula.

Atresia of the Fallopian tube has been referred to. It is not a true congenital—*i.e.*, developmental—atresia, since it is the result of disease in the fœtus.

In all forms of persistent septa, whether longitudinal or transverse, the patient is otherwise well developed as a general rule. Longitudinal septa are compatible with the performance of generative functions—menstruation, conception, and pregnancy. Atresia is a bar to conception, but menstruation may occur, although its products are retained.

(*c*) **Unilateral Atresia.**—In cases of double uterus and vagina coalescence may fail to take place, not only longitudinally, but terminally, so that one vagina runs down as a blind sac by the side of its fellow, which opens externally in the usual way. Hence, while one half of the uterus and vagina may appear, clinically, to be normal, retention of menstrual products may occur in the other half. Similarly, in cases of double uterus with a single vagina, one half of the uterus may have no opening into the vagina; and

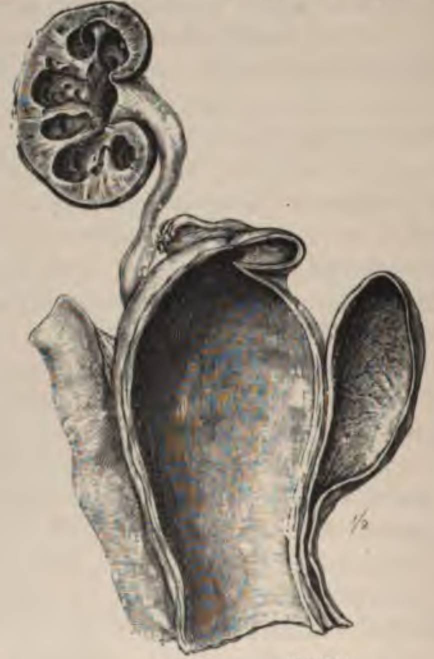


FIG. 19—THE KIDNEY, UTERUS, VAGINA AND BLADDER OF A NEW-BORN INFANT SHOWN IN SECTION. THE DISTENSION OF THE VAGINA AND UTERUS IS DUE TO ATRESIA OF THE VAGINA (MUSEUM OF ST. BARTHOLOMEW'S HOSPITAL).

if this half of the uterus menstruates, its products will be retained.

III. MALFORMATIONS BY EXCESS OF DEVELOPMENT.

Hypertrophy of the Clitoris may occur independently of the condition of pseudo-hermaphrodism, to be described presently, and it may be difficult to distinguish this condition from a benign new growth.

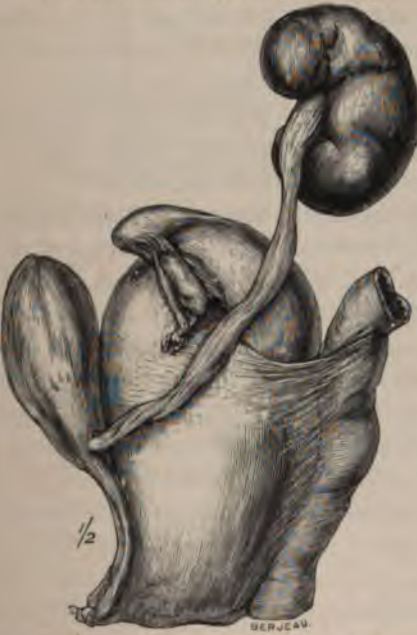


Fig. 20.—From the same Specimen as the Preceding Figure. It shows the Ureter Compressed by the Distended Vagina.

Hypertrophy of the Labia Minora.—There are minor degrees of enlargement, which are in no sense congenital, and which are due in some cases to masturbation. Elongation may, however, be excessive, as is typically seen in the Bush women of South Africa, giving rise to the condition known as the Hottentot apron.

Congenital Elongation of the Cervix affects the vaginal portion, which may attain a length of 2 to 3 inches, and even project through the vulvar orifice. This condition is seldom observed till puberty, so that it is difficult to say whether it is always present from the time of birth, or whether it is incidental to the general enlargement of the pelvic organs that takes place at puberty.

Accessory Ostia Tubæ.—The Fallopian tube is sometimes found with two or even three fimbriated openings. The condition has no clinical importance.

A Third or Accessory Ovary has been described, and some writers even state that it is a common occurrence. A careful consideration of the evidence makes it clear that small pedunculated bodies near the ovary are very frequent, but they are not accessory ovaries. Many of them are partially detached tubes of the parovarium, stalked corpora fibrosa, or small myomata of the ovarian ligament. So far as the facts stand at present, a supernumerary ovary, so separated from the main gland as to form a distinct ovary, has yet to be described by a competent observer.

CHAPTER VI

MALFORMATIONS OF THE REPRODUCTIVE ORGANS (*Continued*).—PSEUDO-HERMAPHRODISM

IV. MALFORMATIONS BY COMBINATION OF MALE AND FEMALE CHARACTERISTICS.

Pseudo-hermaphrodism.—It occasionally happens that children are born with malformed external genital organs, which make it difficult to determine whether the child is male or female. Even when the individual attains puberty the secondary sexual characters appear in such a form as to increase rather than diminish the doubts which were entertained at the child's nativity.

When doubt exists as to the sex of a child, it is often termed a **hermaphrodite**. This term is employed by naturalists to signify an animal possessing conjoined ovaries and testes —a combination occasionally occurring in vertebrata, and known as an ovotestis—or an ovary on one side and a testis on the other. There is no example on record of such combinations in a human individual which survived its birth, but individuals to which the term hermaphrodite is usually applied are those in which there is defective development of the external genitals, and the secondary sexual characters do not necessarily correspond to the actual sex. So far as the human family is concerned, individuals with malformed external genitals should be called **pseudo-hermaphrodites** Two types of these individuals are found:

Gynandria is a condition in which the subject is a female, and possesses ovaries, but has also accessory organs resembling those of the male. The clitoris is large, resembling a small penis, and the labia majora fuse in the middle line, resembling a scrotum. The resemblance is all the more striking if the ovaries are herniated into the labia majora. In such a case the vagina, which is generally small, opens into the urethra at the root of the clitoris, like a hypospadiac male. The uterus may be fairly well developed. The woman may have a beard, and the breasts may be ill developed. A typical case of this malformation is the now historical one of Madeline Lefort.

Androgyna is a condition in which the subject is a male, and possesses testicles, but has also accessory organs resembling those of the female.

The embryology of the genitalia makes it clear, so far as the external organs are concerned, that the male organs are more highly specialized than those of the female, and if the fusion of the parts concerned in forming the penile urethra be arrested, a condition more or less resembling the female is the consequence.

For example, the external genitals represented in Fig. 2! illustrate this very well. The erectile body is really an incomplete penis; the penile urethra is represented by a groove opening into a cul-de-sac which corresponds to an incomplete vulva. The two halves of the scrotum have failed to unite across the median line, and thus resemble labia majora. The right one contains a testis; the left testis was retained in the inguinal canal. This individual was a hypospadiac male, but to his misfortune was brought up as a girl.

Imperfections of this kind in the external genital organs are associated with modifications of the secondary sexual characters. The distribution of hair on the pubes may resemble the female type; often it corresponds to that of a male.

Menstruation depends on the coexistence of a uterus; of this more will be stated later on. The mammæ may be as large as those of a woman; more often they are of the male type. The hair on the head is no guide, for if an individual has been trained as a boy it is short; if a girl it will usually be long.

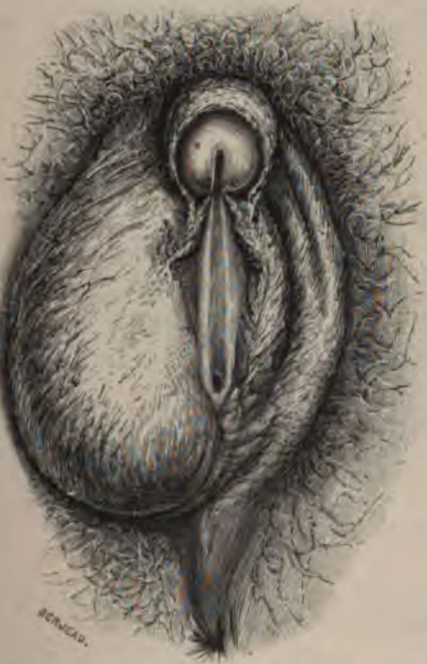


FIG. 21.—THE EXTERNAL GENITALS OF A HYPOSPADIAC MALE OR PSEUDO-HERMAPHRODITE.

The presence or absence of hair on the face varies. A pseudo-hermaphrodite may have an abundant beard and moustache. At puberty the voice usually changes to that of a man, and sexual inclination is manifested for women.

It is a significant fact that the condition of the external genitals in pseudo-hermaphrodites affords no reliable indication of the nature of the internal genital organs. An individual with such imperfections as are presented in Fig. 22 may or may not have a uterus and Fallopian tubes. On the other hand, a uterus may be associated with a perfect penis and testes. The presence of a uterus does not enable us to decide the sex in a doubtful case. In questionable cases of sex the only absolute test is the genital glands. The presence of ovaries is decisive proof of a female ; testes indicate the male ; and, as accurate discrimination between a testis and an ovary is only possible on microscopic examination, it is only in exceptional circumstances that such a test can be applied.

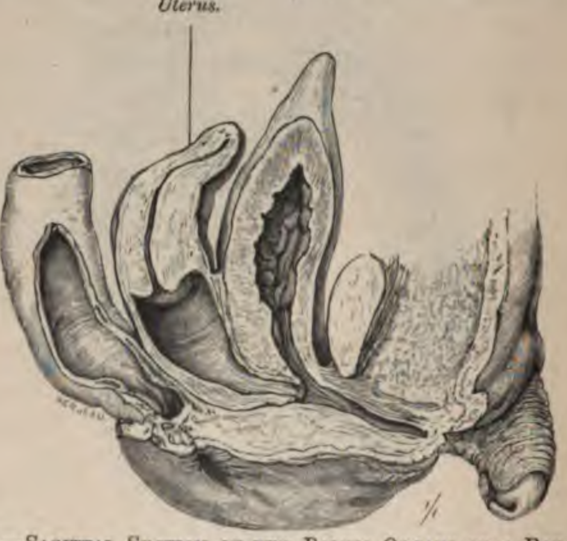


FIG. 22.—SAGITTAL SECTION OF THE PELVIC ORGANS OF A BOY WITH A WELL-DEVELOPED UTERUS (MUSEUM OF MIDDLESEX HOSPITAL).

It is impossible in an elementary work of this kind to describe the various defects of the reproductive organs which occur in pseudo-hermaphrodites, but in the majority of these unfortunate individuals the genital glands are testes, notwithstanding the fact that many of them have a uterus with Fallopian tubes.

The majority of pseudo-hermaphrodites are brought up as girls; this is a misfortune, because at puberty (which may be greatly delayed) the supposed girl suddenly assumes the voice of a man, and begins to grow a beard.

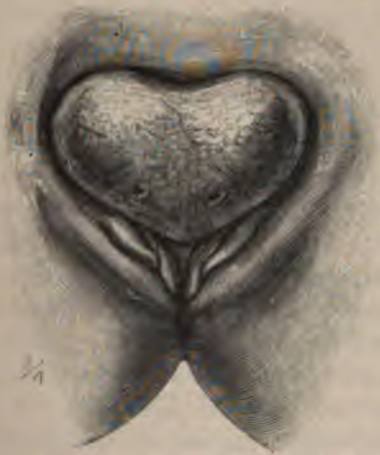


FIG. 23.—EXSTROPHY OF THE BLADDER IN A GIRL (MUSEUM OF MIDDLESEX HOSPITAL).

When there is doubt as to the sex of a child it should be named, trained, and educated as a boy.

Exstrophy of the bladder has sometimes given rise to difficulty in determining the sex of a child (Fig. 23). Careful examination will dispel this difficulty, for on cleaning the pink vesical mucous membrane exposed at the pubes, urine will be seen to escape from the orifices of the ureters.

CHAPTER VII

MALFORMATIONS OF THE REPRODUCTIVE ORGANS OF WOMEN (*Continued*).—CLINICAL ASPECTS OF MALFORMATIONS

I. SYMPTOMATOLOGY.

IT will be convenient to consider here the relation of the various malformations to the general bodily and mental development, to the secondary sexual characters, to menstruation, and to child-bearing.

General Development.—Absence of the genitalia is only found, as we have said, in the case of monstrosities. With marked under-development of the uterus and ovaries—for instance, with rudimentary uterus and infantile ovaries—there are often found retarded physical growth and imperfect mental powers. Slight degrees of under-development are compatible with an otherwise well-formed body and a vigorous mind. The same may be said of malformations in the remaining groups—namely, doubling and atresia of the genital passages, and malformations of the vulva.

Secondary Sexual Characters.—The development of these maintains a fairly close parallel with that of the pelvic organs, so that when the latter are imperfectly formed we find the breasts flat, small, or even absent, the pubic hair scanty or absent, as in the case of a child, and the vulva small.

Menstruation is established late, or not at all, when the uterus is under-developed. A woman with a rudimentary or infantile uterus, or with imperfect ovaries, does not menstruate. Broadly speaking, the occurrence or otherwise of menstruation gives a fairly reliable indication of the degree of development, whilst its characters, where it does occur, also have their significance. If menstruation is normal it may be presumed that there is not any considerable arrest of growth ; if it is late in onset, scanty, and irregular, it can generally be assumed that some degree of under-development exists.

In the case of double uterus, menstruation has nearly always the normal characters, and even if one half be underdeveloped, as in the uterus unicornis, the other half is generally functional. In cases of atresia, the changes incidental to menstruation occur in the uterus, but the menstrual products are, of course, retained (**cryptomenorrhœa**).

The first symptoms of retained menses generally come on within the first year or two after puberty. The patient gives a history of having experienced periodical monthly molimina, without outward signs of menstruation. She may also complain of a swelling in the lower abdomen, which, although it gradually increases month by month, may get somewhat smaller in the monthly intervals. This gradual increase in size, coupled with amenorrhœa, sometimes raises in the minds of her friends a suspicion of pregnancy.

Pain is sometimes felt from the first; in other cases it occurs later, and increases month by month in severity and duration as distension proceeds, till it becomes continuous. Symptoms of pressure on surrounding organs may also be present.

In cases of unilateral atresia the symptoms may be misleading, because the retention of products in the occluded half of the vagina and uterus produces the characteristics just described, while menstruation is taking place apparently normally on the other side.

EFFECTS OF RETENTION OF MENSTRUAL PRODUCTS IN CASES OF ATRESIA.

According to the situation of the atresia and the duration of the symptoms, the following conditions may be met with, shown diagrammatically in Figs. 24 and 25 :

I. **Atresia of the Vaginal Orifice.**—At first the menstrual blood collects in the vagina, which becomes distended (A), and often bulges through the vulvar aperture—*hæmatocolpos*. Later, the cervix distends, and its walls are thinned, the body of the uterus not being at first affected (B)—*hæmatotrachelos*. By continued accumulation the body of the uterus is involved (C)—*hæmatometra*. Lastly, the Fallopian tubes may become distended (D)—*hæmatosalpinx*.

II. **Absence of the Lower or Middle Portion of the Vagina.**—The distension occurs in the same order as above, first the vagina (E) and then the uterus (F) being affected. The lower portion of the vagina, if present, is patulous.

III. **Atresia of the Os Externum.**—The vagina remains normal, and hæmatotrachelos first occurs (G). It is probable that considerable distension may take place here without the body of the uterus sharing in it. Later, hæmatometra and hæmatosalpinx may follow.

IV. **Atresia of the Os Internum.**—The cervix, as well as the vagina, remains free, and a pure hæmatometra is found (H). As a congenital condition, this is rare.

V. **Atresia affecting One Half of a Double Uterus or Vagina.**—Changes occur in the same order as in the case of the undivided organs ; when the atresia concerns the second vagina, hæmatocolpos is first found, the cystic swelling extending either down to the vulva (I) or only part of the way, by the side of the patent vagina (J). Hæmatometra follows (K), or it occurs alone if the atresia affects the os externum (L). In the diagram the various forms of atresia in cases of double uterus are represented as affecting the uterus bicornis; but similar conditions are found in connection with uterus septus and uterus didelphys.

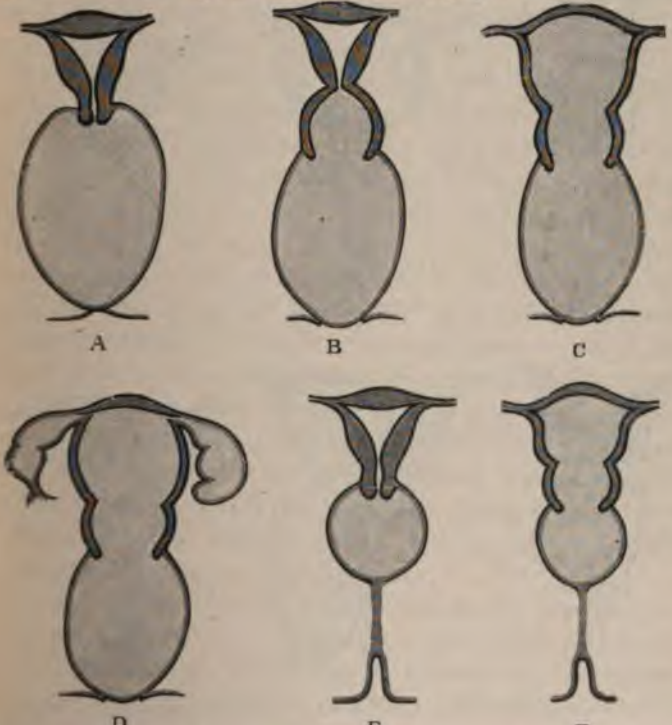


FIG. 24.—DIAGRAM ILLUSTRATING THE EFFECTS OF ATRESIA OF THE GENITAL PASSAGES.

Secondary Changes.—The dilated walls of the vagina, uterus, or Fallopian tubes become thinned out; the contrast between healthy and distended walls is well seen in the uterus itself, where the endometrium suffers considerable atrophy, and the muscular coat is thinned. This thinning may be partly compensated, as in the case of an aneurysm, by the deposition of blood-clot on the internal surface and partial organization of the fibrin.

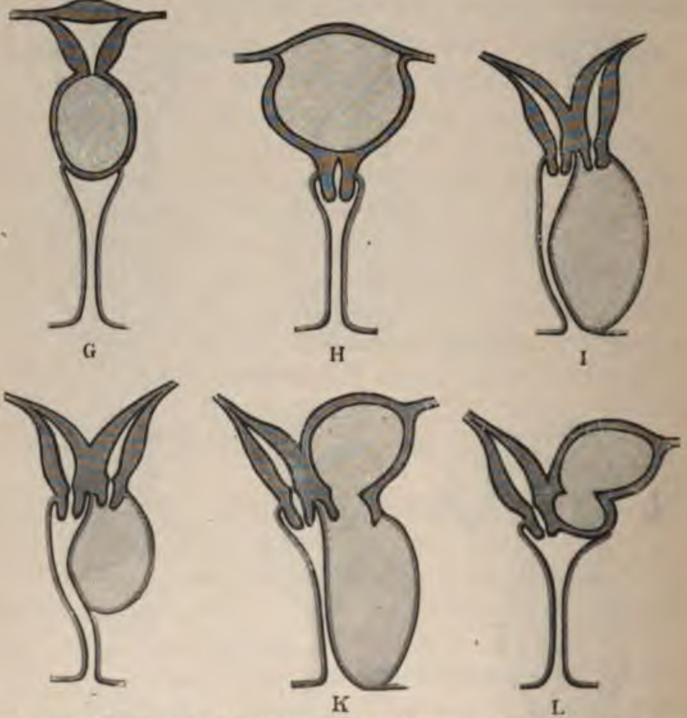


Fig. 25.—Diagram Illustrating the Effects of Atresia of the Genital Passages.

Suppuration may take place, either spontaneously or through a temporary fistulous aperture. When the atresia is secondary, this result is more common. The vagina, uterus, or Fallopian tubes may then become bags of pus, and the terms pyocolpos, pyometra, and pyosalpinx are applied.

Physical Signs.—On abdominal palpation a tense fluctuating swelling may often be felt rising out of the pelvis; and if the obstruction be at the vulva it may be seen bulging here also. Fluctuation may be obtained on pressing alternately on the abdominal and vulvar swellings. When the uterus itself is not involved, it may sometimes be felt through the abdomen as a solid projection at the summit of the cystic swelling.

We shall consider in succession the physical signs afforded by the different conditions above enumerated.

Atresia of the Vaginal Orifice.—The finger at once meets the resistance of the cystic swelling at the vulva, and no passage exists by the side of it. By combined rectal and abdominal examination it can be felt that the mass fills the pelvis; if seen early the fingers may meet above the swelling, or the undilated uterus can be made out. If hæmatometra also exists, the swelling is larger; but the degree to which the uterus is involved cannot usually be determined till the retained fluid has been evacuated. An irregularity of the summit of the swelling can often be felt by the abdomen when the Fallopian tubes are distended; but this is not always the case, because the tubes are apt to be drawn into a position parallel with the uterus, just as when the uterus is enlarged by pregnancy or a myoma.

Absence of the Lower or Middle Part of the Vagina.—The short cul-de-sac, when it exists, is patent for 2 or 5 centimetres, but nothing further can be made out by the vagina. On examining by the rectum, the finger will readily recognise a sound introduced through the urethra, there being but little tissue intervening. But, higher up, the finger meets the resistance of a cystic swelling, continuous with a similar swelling felt by the abdomen when the distension is considerable. If the vaginal deficiency extends to near the uterus, it may not be possible to reach the hæmatocolpos through the rectum; and an ill-defined abdominal fulness may be the only thing felt. But this, taken in conjunction with the history and symptoms, may serve for diagnosis.

Atresia of the Os Externum.—The cervix presents in the otherwise normal vagina, as a smooth fluctuating swelling in which no aperture can be discovered. Bimanually the mass is felt to occupy the position of an enlarged uterus. The fundus may be felt as a smaller and harder projection at the summit of the elastic swelling.

Atresia of the Os Internum.—The cervix feels and appears normal; the body of the uterus is uniformly enlarged, and feels almost exactly like a pregnant uterus.

Atresia of One Half of a Double Uterus or Vagina.—The patent half of the vagina is narrow, but otherwise resembles the normal. The uterus appears to be pushed over to one side, and the sound passes in a lateral direction for a normal distance. On one side of the vagina is felt a fluctuating swelling, extending down to the vulva, or reaching only part of the way. It bulges toward the healthy side so as to further narrow the vaginal passage. By bimanual examination the swelling is felt to extend up to the side of the uterus, with which it is closely connected. When the vagina is undivided, and the atresia is situated at the external os of the second uterus, the upper part of the vagina is very wide. At one side is the normal cervix, through which a sound can be passed into the uterus, where it takes a lateral direction. The rest of the vaginal summit is occupied by a cystic swelling lying to the side of the uterus and cervix, which it has displaced beyond the median line. The depression between the distended and the empty half of the uterus may be felt by abdominal palpation or by the bimanual method.

Results of Atresia.—If left untreated, the fluid gradually accumulates, the size of the swelling causing great discomfort as well as severe pain. Two grave complications threaten: suppuration may take place, and a large abscess form, which opens into the rectum or the peritoneal cavity, or points externally; or rupture of some part of the sac occurs. The dilated tubes are most likely to give way, because in them the greatest thinning of the walls takes place. From either complication death may result. It is important to remember that a hæmatocolpos or hæmatotrachelos may exercise injurious pressure on the ureters.

Characters of Retained Menstrual Blood.—This is of a dark chocolate colour, sometimes black. It is viscid, owing to partial absorption of the liquid portion of the blood, and flows slowly, like treacle or honey. It is mixed with mucus, and seldom contains coagula. Cholesterin crystals are sometimes found. Microscopical examination shows the presence of old and altered epithelial cells, and blood corpuscles in various stages of disintegration.

Child-bearing in Relation to Malformations.—When the pelvic organs are under-developed, sexual desire and feeling are frequently absent, or only slightly present. Desire probably depends more upon the development of the ovaries than upon any other individual factor; but sexual feeling during intercourse will also vary according to the degree of development of the vagina and vulva. Child-bearing does not depend, however, upon sexual inclination or sensation, but upon the production of healthy ova, the ability of the uterus to nourish a fertilized ovum, and the possibility of coitus taking place. Under-development of the ovaries leads to complete and permanent sterility. Under-development of the uterus has the same effect, both because it is usually associated with defective ovulation, and because the uterus is unfit for pregnancy. A woman with a double uterus is often fertile, and several pregnancies may take place without the malformation being even suspected; but complications may occur during labour. Sexual intercourse is possible as long as the vagina is well enough developed, whatever be the condition of the internal organs. The conditions which prevent coitus are absence, atresia, and stenosis of the vagina.

In pseudo-hermaphrodism the vagina is usually small. If a case of atresia of the vagina be treated early, coitus can take place, and, theoretically at least, may be followed by conception; but if considerable changes have taken place in the uterus, owing to distension, before the obstruction is removed, it is doubtful whether the patient could conceive. We have not met with or heard of a case where a patient who had had atresia of the vagina became pregnant subsequently.

II. Diagnosis.

The diagnosis of malformation will depend in the first place on inspection, when any external abnormality will be at once discovered, and the patency or otherwise of the vaginal orifice determined. A digital vaginal examination will show whether the vagina is unduly narrow or short, or whether the cervix is normally developed. Two vaginæ may be thus discovered, each containing a cervix; or two cervices may be found in a single vagina. Bimanual examination will then be necessary to determine the degree of development of the uterus, tubes, and ovaries. This information can also be obtained, though less satisfactorily, by a recto-abdominal examination. The sound will lend assistance in ascertaining the length of the uterus, and may also enable one to demonstrate that the uterus has two cavities. The uterus may be found to be very small or rudimentary, and it may even be impossible to feel it at all bimanually. When the ovaries are small they are often difficult to feel, and it may not be possible to form any conclusion as to their development, except by inference.

A hæmatocolpos is usually readily diagnosed by the signs and symptoms above mentioned.

Hæmatometra must be diagnosed from pregnancy: the integrity of the hymen, the absence of vaginal pulsation and discoloration, and of the symptoms of pregnancy will serve as a guide, as will also the condition of the cervix, which is elastic and smooth in the case of hæmatotrachelos, and which does not present the softness characteristic of pregnancy when the obstruction is at the internal os. In cases of doubt the patient may be kept under observation for some time; the swelling will increase, but not nearly so quickly as is the case in pregnancy. Hæmatotrachelos might be simulated also by a cyst in the upper part of the vagina; careful examination will discover the cervix beyond the cyst in the latter case. Other conditions which superficially resemble hæmatometra, such as inversion of the uterus or a large cervical polypus lying in the vagina, do not occur at the age at which hæmatometra is met with; and there should be no difficulty in the diagnosis.

Retention of menses in a second vagina or uterus leads to much greater difficulty in diagnosis. Thus lateral hæmatocolpos must be distinguished from abscess in the vaginal wall, pelvic abscess burrowing down by the side of the vagina, vaginal cysts, encysted collections of fluid bulging down in the recto-vaginal pouch, and, when the upper part of the vagina is principally involved, from ovarian or parovarian cysts and distended tubes. The latter would be recognised, principally by their shape, on recto-abdominal examination. The nature of lower vaginal swellings will probably not be made out till they are incised; whilst in the case of swellings higher up, the abdomen will most likely be opened, under the impression that the case is one of ovarian cyst.

Hæmatometra in a second uterus is often diagnosed as ovarian or tubal cystic disease, or as a dermoid. The only clue, in the absence of all trace of a second cervix or of a double vagina, lies in the close connection of the swelling with the uterus; but even this distinction may not be apparent, as the depression in the fundus in the case of uterus bicornis, or the almost complete separation of the two halves in the case of uterus didelphys, gives the impression that the swelling is extra-uterine. As a matter of fact, the nature of the case is rarely recognised until the abdomen has been opened in the operating theatre or the post-mortem room.

III. TREATMENT.

The scope of treatment for malformations of the female genital organs is necessarily limited. When there is under-development of the uterus and ovaries, no treatment is of any avail; and in cases of doubling of the uterus and vagina no treatment is usually necessary. But if the vaginal septum interferes with intercourse, or obstructs labour, it should be divided; and, if possible, either a portion or the whole length of it should be excised. If the clitoris or labia are so enlarged as to cause discomfort, or if the cervix is much elongated, resection of the part is indicated.

A hæmatocolpos must be opened. The incision should be free, and the contents allowed to escape without any pressure. By too rapid evacuation, rupture of a hæmatosalpinx may be brought about; but the danger of this has probably been exaggerated. A more serious risk is that of septicæmia; on this account the strictest asepsis should be adopted. When the greater part of the fluid has been evacuated, gentle irrigation may be employed to clear out the residue and prevent decomposition changes from taking place. The principal difficulty in after-treatment lies in the tendency of the orifice to contract; for this reason the incision must be free, and, if necessary, a part of the wall should be dissected out. The passage of bougies may be subsequently required from time to time.

The treatment of atresia with absence of a part of the vagina is more difficult. An attempt should be made to dissect down to the deeper part of the vagina, so as to make a complete vagina; this is especially necessary in cases of retention. The first difficulty is in the actual dissection, which must be made between the urethra in front and the rectum behind: a distance of many centimetres may be traversed before the blind end of the vagina is reached. The second, and perhaps greater, difficulty is to maintain the patency of the vagina when formed. With this end in view various plastic operations have been devised, portions of skin being turned in. Repeated operations, extending over many months, have sometimes been required; but several ultimately successful cases have been reported.

Hæmatometra also requires incision. Sometimes the obstructing membrane is so thin that a probe or sound can readily be pushed through it; in other cases a knife is required. After incision, forceps should be introduced to secure a free aperture, and after evacuation the cervical canal is loosely packed with iodoform gauze; whilst later the tendency of the orifice to contract must be met by the use of dilators.

The great difficulty of maintaining the patency of the opening made for the evacuation of the retained blood in hæmatometra has induced several operators (Fenton, Bland-Sutton, and Herman) to remove the uterus by cœliotomy. The results are excellent, and it is probable that "conservative hysterectomy"—that is, removal of the uterus, with preservation of one or both ovaries—will become the recognised method of dealing with this very troublesome condition.

Lateral hæmatocolpos must be treated on the same principles as the above, but the vaginal septum should be freely removed, so as to make only one vagina, otherwise the opening will almost certainly close again, and, having once been opened, septic organisms may find their way in, and a pyocolpos be found the next time instead of a hæmatocolpos. Of this there are several instances on record.

In the case of lateral hæmatometra, vaginal incision should be practised when possible, and part of the uterine septum may be removed, to prevent reclosure. If the condition be discovered after opening the abdomen, vaginal incision should still be performed when the two halves of the uterus are closely connected; although, if at the same time there be vaginal deficiency, hysterectomy will probably be called for.

In cases of separation of the two halves of the uterus, as in marked instances of uterus bicornis or uterus didelphys, the occluded half may be removed by hysterectomy. There are several cases recorded in which this was done.

Hæmatosalpinx calls for removal of the distended tube.

CHAPTER VIII

DISEASES OF THE VULVA

Diseases of the Vulva.—We shall describe these in the following order:

I. Injuries of the vulva.
    Accidental injuries.
    Injuries during coitus.
    Injuries during labour.

II. Inflammation of the vulva.
    Simple vulvitis.
    Infective vulvitis (including gonorrhœa).

III. Vascular disturbances.
    Varicocele or varix.
    Hæmatoma.
    Œdema.
    Gangrene.

IV. Cutaneous diseases of the vulva.
    Erythema.
    Eczema.
    Herpes.
    Lichen.
    Tuberculosis.
    Syphilis.
    Condylomata.

Elephantiasis.
Vulvitis pruriginosa.
Kraurosis vulvæ.
Pruritus vulvæ.

V. Morbid conditions of the clitoris, hymen, urethral orifice, and perineum.

VI. Tumours and cysts of the vulva.
- (*a*) Tumours—
  - Lipoma.
  - Fibroma.
  - Myxoma.
  - Angeioma.
  - Papilloma.
  - Sarcoma.
  - Carcinoma.
- (*b*) Cysts—
  - Mucous and sebaceous cysts.
  - Bartholinian cyst or abscess.
  - Hydrocele of the canal of Nuck.
  - Hernia.

Age-changes.—*Infancy.*—At this period the mons veneris is devoid of conspicuous hair, and the labia majora appear as two parallel cutaneous eminences; the thin edges of the labia minora project between them, and are pink, like mucous membrane.

Puberty.—At this stage the pubic hair becomes conspicuous, and usually grows freely on the outer surfaces of the greater labia. The labia increase in size, and usually conceal the nymphæ. Their opposed or internal surfaces remain pink, whilst the outer surfaces become pigmented, especially in brunettes.

The nymphæ often grow after puberty, and instead of remaining concealed within the vulvar cleft, protrude, and resemble a pair of elongated molluscan palps. They then undergo a curious change: those parts covered by the labia majora retain their pinkness, and possess as usual very large sebaceous glands, but the palp-like portions become deeply pigmented, lose their sebaceous glands, and occasionally delicate hairs of two or more centimetres in length grow from them. Labia minora elongated in this way are sometimes spoken of as "hypertrophied nymphæ." Some writers attribute the condition to masturbation. It reaches its maximum in Hottentot women, whose "apron" is formed of the greatly elongated nymphæ.

Menopause.—After the forty-fifth year the hair on the mons and labia, like that on the rest of the body, becomes white, and is gradually shed. The greater labia shrink as the subcutaneous fat disappears, and the nymphæ project beyond them, and the vulvar orifice becomes narrowed.

I. INJURIES OF THE VULVA.

These occur in three ways: by accident, during sexual intercourse, and during parturition.

Accidental injuries are rare, but may result from a kick, a fall with the legs apart upon such a thing as the back of a chair, or the breaking of a chamber utensil when the patient is sitting upon it. Inasmuch as the vulva is very vascular, hæmorrhage may be very free. Such injuries require to be dealt with on ordinary surgical principles, according to the nature of the case.

Injury during coitus consists mainly in unusual tearing of the hymen. Bleeding from a tear of the hymen itself is always inconsiderable; but if the tear extend beyond the base of attachment of the hymen into the substance of the lateral wall of the vagina, bleeding may be free, and even alarming. Treatment will consist in clearing away clots, securing any bleeding vessel, and sewing up the tear. Oozing may require restraint with form pads and pressure.

Injury during parturition nearly always consists of a rupture of the perineum; occasionally there may be tearing of the lateral walls of the vagina, extending into the vulva, but then the cause is usually to be found in careless instrumental delivery. (See Perineum.)

II. INFLAMMATION OF THE VULVA.

Vulvitis may be simple, infective, or of the nature of a dermato-neuritis.

Simple vulvitis may be due to want of cleanliness, irritating discharges from the uterus, or excessive intercourse. In children it is said to result from thread-worms. It may also be a part of a trauma of the vulva. The symptoms are heat, pain, and throbbing in the vulva, aggravated by exercise. The vulva is congested, red, and swollen. The swelling may affect individual parts, such as the labia majora, nymphæ, or clitoris; or the whole vulva may be involved. If due to injury, bruising may be seen. The treatment consists of rest, thorough cleanliness, and fomentations. Intercourse must, of course, be avoided.

Infective vulvitis is nearly always gonorrhœal, and it then forms part of a more general infection affecting the genital tract. The symptoms are as above, with the addition of two important features—namely, a muco-purulent yellow discharge, and scalding pain on micturition. On physical examination the vulva is red, swollen, and bathed in a yellow discharge, the urethral orifice is nearly always reddened, and on pressing along the urethra from within outwards a drop of pus can usually be forced out. The orifices of the Bartholinian ducts are often red and unduly patent. As a result of the irritating discharges, the skin is often excoriated, not only over the vulva, but also over the contiguous part of the thighs and round the anus. Microscopically the gonococcus can be detected in the secretion, usually in the interior of cast-off epithelial cells. The presence of the gonococcus is the only certain indication that the disease is gonorrhœal; but infection of the urethra and Bartholinian ducts is in itself strong presumptive evidence.

The lymphatics of the vulva pass to the horizontal set of inguinal glands; these will therefore be enlarged and tender in cases of severe vulvitis.

Course and Complications.—Under proper treatment, a simple vulvitis runs a short course to recovery. If neglected, or if septic from the first, the possible complications are urethritis, labial abscess, œdema and gangrene of the labia, infection and abscess of Bartholin's glands, inguinal bubo, vaginitis, endometritis, salpingitis, and peritonitis.

Treatment.—The patient should be kept in bed if possible; if there be constitutional disturbance, this is essential. The parts must be kept thoroughly clean; a warm sitz-bath medicated with boracic acid, carbolic (1 in 60), or biniodide of mercury (1 in 2,000), and repeated several times a day, will ensure cleanliness and relieve pain. After a bath or irrigation the vulva should be well dried, and dusted with oxide of zinc, and a pad of cotton-wool applied. If there be suppuration on the surface, all discharge should be removed by irrigation, and the surface swabbed over with nitrate of silver solution (2 per cent.), chloride of zinc (5 per cent.), or carbolic (10 per cent. in glycerin). Fomentations wrung out of boracic acid may then be applied. When the inflammation is severe, the patient should lie with the knees supported on a pillow, and separated to prevent the contact of the tender surfaces. The vulvar affection is, of course, the least important part of an attack of gonorrhœa, and the main purpose of treatment is to reach the cervix and vagina. The best plan is a thorough antiseptic washing of the vagina and cervix with biniodide of mercury (1 in 1,000), after which douches of a weaker solution of the same lotion (1 in 3,000) should be given twice or three times daily. The exhibition of mercury internally often exerts a very favourable effect on the course of the disease. The urethral condition is best treated by diuretics and copious drinking of milk and barley-water; if it remains obstinate a dressed probe soaked in a 2 per cent. solution of nitrate of silver may be passed into the urethra. Diet should be light, and stimulants forbidden.

Diphtheritic vulvitis is characterized by the formation of a membrane, which is composed of fibrin, and stains typically with Weigert's stain; the Klebs-Loeffler bacillus is found in it. It is important to remember that a membranous vulvitis may be non-diphtheritic; in that case the membrane, in contradistinction to the features above indicated, is composed of necrotic material, in which outlines of cells may still be made out, and containing little or no fibrin. The organism present is usually the streptococcus.

Erysipelas of the Vulva.—This generally follows labour, and occasionally wounds of the vulva. It behaves in the same way as when affecting the skin elsewhere; but owing to the laxity of the connective tissue of the labia there is much swelling. Since the use of antiseptics in midwifery it is less often seen, and should be regarded as a *preventable* disease, at any rate, when occurring as a complication of child-bed.

It is seldom confined to the vulva, but spreads thence to the thighs, abdomen, and buttocks. The labia minora are apt to suffer severely, for their blood-supply is interfered with, and ulceration, perforation, or gangrene may follow. It is important that when this condition exists no internal examination should be made; otherwise the internal organs may be infected and septicæmia supervene.

The *treatment* is that of erysipelas in any other part of the body.

Abscess of the Vulva.—This is occasionally due to injury or to suppuration following on cellulitis, erysipelas, or hæmatoma. But in many cases it arises in the sebaceous glands of the labia and in the ducts of Bartholin's glands. As a rule, one side only is affected. As might be expected, gonorrhœa is the principal cause.

The signs are those of an abscess in other situations, local redness, swelling, heat, and pain, often accompanied with febrile symptoms.

Treatment.—This consists in a free incision to evacuate the pus, warm bathing followed by fomentations, and strict cleanliness.

Dermato-neuritis is considered under cutaneous affections.

III. VASCULAR DISTURBANCES OF THE VULVA.

Under this heading we have to consider varicocele, hæmatoma, œdema, and gangrene.

Varix.—The vulva is well supplied with veins, and contains especially a good deal of erectile tissue. Obstruction to the venous circulation in the pelvis, abdomen, or thorax consequently readily causes the veins to assume a varicose condition. This is found very often during the later months of pregnancy, and in some cases the enlargement may be extreme, forming a swelling, on one or both sides, as large as a fist, involving principally the labia majora, and presenting to the touch the characteristic feeling of " worms in a bag," which is met with in varicocele of the scrotum. The left side is more often affected than the right. The dilated and tortuous veins can also be readily seen through the skin. The veins of the thigh are generally also involved, and on inspecting the vagina, similar venous plexuses may be seen, extending up a considerable distance under the mucous membrane. There is a great risk of rupture of these veins during delivery; either the surface veins may give way, giving rise to serious bleeding, or subcutaneous rupture may occur, producing a hæmatoma of the vulva.

Treatment.—Rest in the horizontal position diminishes the swelling; but when associated with pregnancy, no cure can be hoped for till after delivery. In severe cases it may be advisable to induce premature delivery, to diminish its severity and duration, and, through the smaller size of the child's head, lessen the risk of rupture and thrombosis. When due to other varieties of backward pressure on the veins, the cause must be treated.

Slight cases are often associated with chronic constipation, and in these, as well as in severer cases, great improvement results from attention to the bowels. When a varix persists after delivery, or fails to improve under rest and general treatment, it is necessary to excise it. The operation is usually attended by free bleeding, but when done with care it gives good results.

Hæmatoma of the Vulva.—This is due to subcutaneous rupture of veins in the labia majora, and is nearly always traumatic. A fall or blow may cause it, but it generally occurs during labour, especially when the child's head is large, and has rested long on the perineum. A varix during pregnancy greatly predisposes to this accident.

The condition is usually easily recognised from the history, and from the presence of a smooth, fluctuating swelling in the labium majus, which has formed quickly, and is irreducible. These points serve to distinguish it from hernia, and from abscess and cyst of the labium. It may not be easy to distinguish it from simple œdema; but this is unimportant, as the treatment is the same.

Treatment.—On no account should a hæmatoma be opened, unless it is enlarging quickly, when there is probably a large vessel ruptured; in this case a free incision should be made, the clots turned out, and the bleeding-point secured. Otherwise the extravasated blood tends to absorb readily, and generally subsides in two or three weeks.

Occasionally a hæmatoma suppurates and requires free incision, drainage, and strict cleanliness.

Œdema of the Vulva.—This may occur as the result of vulvitis, and is then commonly due to spreading of the inflammatory process to the deeper tissues, involving vessels and lymphatics. More often it depends upon pressure on the pelvic veins, by tumours, pelvic inflammation, or the pregnant uterus. It may also form part of a general anasarca, the consequence of cardiac or renal disease. The labia minora and prepuce clitoridis are specially apt to be affected; in other cases the œdema spreads over the labia majora and mons veneris. In extreme cases the swelling may form a mass the size of a fœtal head.

The *treatment* consists in rest in bed, moderate purgation, and warm fomentations, if due to phlebitis and lymphatic obstruction. When due to pressure, the cause must, if possible, be dealt with—*e.g.*, a tumour should be removed, pelvic inflammation should be treated as described under that heading; pregnancy may occasionally require to be prematurely terminated. As a palliative measure, small punctures may be made with a narrow-bladed scalpel.

Gangrene of the Vulva.—This occurs under the following conditions:

1. As the result of injury, especially long-continued pressure of the head in the third stage of labour, or from the unskilful use of instruments.

2. Following œdema, cellulitis, or erysipelas of the vulva.
3. As a complication of some of the exanthemata, as small-pox, scarlet fever, measles, and typhus.
4. In underfed and dirty children, when it is analogous to noma or cancrum oris.
5. As a result of phagedenic ulceration.

Except in the last case, when the clitoris is apt to be involved, the nymphæ are most apt to suffer; they may be perforated, or the lower portion may slough off.

The *treatment* consists in supporting the patient's strength, in keeping the parts as clean as possible with antiseptic applications, and in relieving pain by hot fomentations, with opium internally, if necessary.

CHAPTER IX

DISEASES OF THE VULVA—(*Continued*)

IV. CUTANEOUS DISEASES OF THE VULVA.

THE vulva is liable to be affected by a number of cutaneous diseases, of which the most important are erythema, eczema, lichen ruber, tuberculosis, syphilis, condylomata, leukoplakia, elephantiasis, vulvitis pruriginosa, and kraurosis.

Erythema is usually a transient condition, but it may assume a more chronic form as the result of irritating discharges and want of cleanliness. In very stout people it may be due to intertrigo, when it becomes worse in hot weather.

Treatment consists of rest, cleanliness, and the use of dusting powders, such as oxide of zinc, calomel, or bismuth subnitrate mixed with starch or talc powder.

Eczema presents the same characters as in other parts of the body; the mucous surface is not usually involved, but the cutaneous surface shows the typical papules, which become vesicular and break. The escaping serous fluid forms crusts, and the condition is usually aggravated by scratching, which is almost unavoidable, owing to the intense irritation. It may be associated with constitutional conditions, such as rheumatism, gout, and diabetes; in other cases it is kept up, if not caused, by irritating discharges from the uterus, or by leakage of urine, as from weakness of the bladder-sphincter or a vesico-vaginal fistula.

Treatment.—Any constitutional or local causes that may be present should be treated. The importance of avoiding scratching should be insisted upon. In the dry forms a lotion of 2 per cent. formalin will be found useful, followed by an ointment such as hydrargyri ammoniatum 1 part in 32 parts of lanolin. In moist forms the crusts should be removed with a strong potash soap, and a dusting powder applied, composed of glutol, 1 part, and talc powder, 7 parts (Blake). In gouty cases mild applications of ichthyol will be found useful.

Herpes of the Vulva.—This is also a vesicular condition, but the vesicles are arranged in small groups, and the intervening erythema is less marked, or absent. The vesicles may run together, forming bullæ. Herpes is not infrequently associated with the menstrual periods, especially when these are characterized by dysmenorrhœa, and with pregnancy. If a herpetic patch ulcerates, it may resemble a chancre, especially if the inguinal glands are affected. Great irritation is the principal symptom. It usually runs a short course, if not aggravated by scratching.

Treatment.—This is similar to that recommended for eczema.

Lichen ruber occasionally attacks the vulva; in the course of disappearance it is apt to simulate kraurosis. It usually yields readily to the exhibition of arsenic internally.

Tuberculosis is somewhat difficult to distinguish from syphilitic nodules or ulceration. It may appear in the form of lupus, resembling that seen on the face, in which case it presents one of two forms, being mainly ulcerative or mainly hypertrophic and "tubercular." Histologically such an ulcer is composed of characteristic tubercular granulations, while typical tubercles are scattered through the deeper tissues. Tubercle bacilli may be demonstrated therein. Probably many distinct conditions have been described under the name of lupus, such as various syphilides when ulceration has occurred, gummata, and elephantiasis. The condition found in kraurosis, when there are small reddened sensitive patches, has been called lupus, and indeed the latter term has been loosely applied to almost any ulceration of the pudenda.

It is better to restrict the term "lupus" to tuberculous skin lesions; and in this sense lupus of the vulva is exceedingly rare.

The best treatment is to excise the affected parts.

Syphilis.—This disease may manifest itself on the vulva as a primary sore (chancre), or as mucous plaques and tubercles. Tertiary lesions and gummata are uncommon. In the late stages the opposed surfaces of the labia are liable to a change similar to that often seen on the tongue, and known as leukoplakia. In infancy congenital syphilis sometimes declares itself in the labia in the form of characteristic coppery-red spots. It is important to remember that a typical leukoplakia may occur on the vulva quite independently of syphilis, and that vulvar, like lingual, leukoplakia may ulcerate and become the precursor of squamous-celled carcinoma.

Condylomata of the vulva are sometimes syphilitic, but they are also, and indeed more frequently, seen in cases of gonorrhœa where there is no evidence of syphilitic infection. They appear as raised patches with a flattened surface on which red points appear, which may merge into ulcerated patches. The whole vulva may be covered with condylomata, and they may extend backwards and surround the anus. The surface of the vulva is bathed in a muco-purulent discharge. The patient complains of great pain and soreness, which is bad when walking, and which may be even worse when sitting down. This condition yields very rapidly to proper treatment, of which the first and most important principle is cleanliness. Rest should be enjoined as far as possible. The local treatment which we have found the most satisfactory is bathing the vulva several times a day with lotio nigra, and vaginal douching with 1 in 2,000 of biniodide of mercury; this is followed by the application of mercurial ointment, and mercuric iodide is administered internally.

Elephantiasis.—This condition is due to chronic inflammation of the lymphatics, with dilatation of their canals, leading to hypertrophy of the cutaneous structures, and a pale thickened rugose condition of the surface, resembling the rind of an orange. In the more advanced stages thrombosis occurs in the lymphatic vessels, and later still the glands are affected. The parts principally involved are the labia majora, less frequently the clitoris and labia minora; whilst the affection may spread to the perineum and adjacent parts of the thighs. It is but rarely seen in temperate climates; in the tropics it is more common, and the negro races are the principal sufferers. It is often associated with filaria in the blood. From rubbing against the thighs and clothes, superficial ulceration is apt to occur. When the enlargement is great, and much discomfort is caused by the heavy pendulous masses (which sometimes weigh many pounds), they should be removed with the scalpel or thermo-cautery.

Vulvitis pruriginosa is a dermatitis of the vulva in which the nerve-endings are largely involved, with the result that intense irritation occurs. The skin of the affected parts is red and hot at first; later the surface may become paler, and the epithelium appears thickened and sodden; usually marks of scratching are seen. It would appear that in some cases this condition is the precursor of kraurosis. The cause of it is not clear; it is probably due generally to trophic nerve-disturbances. It is doubtful whether it can be brought on by the irritation of excessive secretions, though these may also lead to pruritus.

The treatment is similar to that of kraurosis.

Kraurosis Vulvæ.—This disease, to which Breisky, in 1885, gave the name kraurosis (χραῦρος, dry, withered), was first accurately described by Lawson Tait, in 1875, as an atrophic change affecting the nymphæ.

Symptoms.—The patient complains of irritation referred to the vulva, excessive pain during sexual intercourse, and on passing water, and of a yellowish discharge. The irritation is worse when the patient is warm in bed, and commonly disturbs or prevents sleep. As a result, the general health is impaired, the appetite fails, and the face has a harassed look.

Physical Signs.—In the early stage the skin of the labia minora, vestibule, and clitoris is smooth and shiny; the urethral meatus presents a red, caruncular appearance, and along the margins of the carunculæ myrtiformes there are small patches as of subcutaneous hæmorrhage, which are often exceedingly tender to the touch. Later, the nymphæ diminish and finally disappear, while the orifice of the vagina becomes so contracted that, even in a multipara, it will barely admit a finger. The pubic hair has a peculiar stubbly aspect, and near the labia majora may be coarse and broken. In the final stages the vulva is very pale, with a look as if it had been ironed, all folds and creases having been smoothed out.

The vagina, above the hymen, is not affected; the labia majora also generally escape, but in many patients kraurosis of the vulva is associated with marked atrophy of the uterus.

Pathology.—The disease occurs mostly after the age of forty; its cause is unknown. It is best described as a progressive atrophy of the vestibule and nymphæ.

Microscopically there is seen hypertrophy of the epidermis, and hyaline transformation of the outer portion of the corium, with entire absence of hair-follicles and sebaceous glands. In the subepithelial tissue there is sclerosis of elastic and muscular fibres, great development of fibrous tissue, and small cell infiltration, and small localized hæmorrhages occur. The nerve-endings become compressed, and this probably accounts for the great irritation.

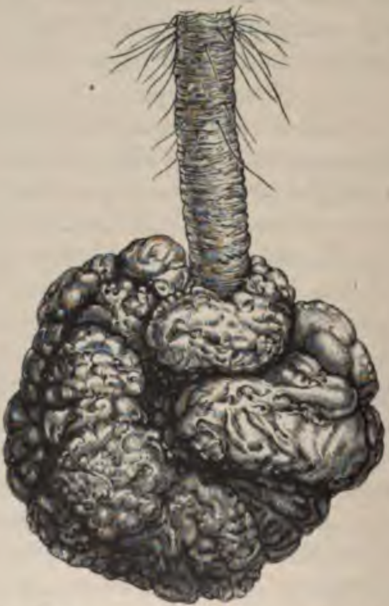


FIG 26.—A PEDUNCULATED MOLLUSCUM FIBROSUM.

From the labium majus of a woman fifty years of age. It had existed many years.

Course and Prognosis.—The disease, if left alone, runs a chronic course of five or six years. During this time there is great suffering and discomfort, but ultimately, when the atrophy is complete, the pain disappears. The parts remain friable. Even coitus may cause troublesome lacerations, and these are considerable if pregnancy and labour supervene.

Treatment.—In this condition, as in the preceding, temporary relief may be afforded by sedative and cooling applications, such as evaporating lotions, glycerole of belladonna, or opium or cocaine ointment. A useful lotion is one composed of 1 ounce each of glycerine and dilute acetic acid, with 10 ounces of a 1 in 20 solution of carbolic acid. In more obstinate cases the affected parts may be painted over, under an anæsthetic, with a 20 per cent. solution of carbolic acid in glycerine; the resulting sore is treated with some sedative ointment. In very severe and intractable cases the diseased area must be freely excised; the cut margin of the skin is then sutured to the cut edge of the vaginal mucous membrane.

Pruritus vulvæ is a symptom which may be due to a variety of causes. These fall naturally into three groups:

(i.) Irritating discharges.

(ii.) Diseases of the vulva.

(iii.) Reflex irritation.

GROUP I.—This will include diabetes, cystitis, and leucorrhœa.

(*a*) **Diabetes.**—The margins of the urethra and the vestibule are congested. The examination of the urine and the history of the case will establish the diagnosis. The irritation may be lessened by sedative applications to the vulva and urethra. Pruritus is often the first symptom which leads to the detection of diabetes.

(*b*) **Cystitis.**—The pruritus is generally a minor feature, and is usually relieved by washing out the bladder.

(*c*) **Leucorrhœa.**—In view of the number of instances in which leucorrhœa exists without pruritus, it seems doubtful whether this cause can act alone, without some predisposing or accessory condition. Nevertheless, the cure of the vaginitis or endometritis, as the case may be, will generally be followed by disappearance of the pruritus. In many cases the inflammation has started with gonorrhœa, and then the concurrent urethritis helps to keep up the irritation.

GROUP II.—(*a*) **Congestion of the Vulva.**—This may be due to varicose veins caused by pressure in the pelvis, or to functional causes. In the former case the causal condition must be dealt with. The possible conditions are retroversion of the gravid uterus, simple pregnancy, a uterine or ovarian tumour blocking up the pelvis, pelvic cellulitis, or intra-abdominal pressure on the vena cava.

Functional congestion may be associated with the menstrual epochs, and the pruritus will then be periodic, or it may be due to masturbation. The latter is not infrequently associated with pruritus, but whether as cause or effect it would be difficult to decide.

(*b*) **Vulvitis and Kraurosis.** — These have been already described.

(*c*) **Pediculus Pubis.**—This is readily recognised on inspection. The pubes should be shaved and thoroughly cleansed with a solution of perchloride of mercury (1 in 1,000).

GROUP III.—REFLEX CAUSES.—(*a*) **From the Rectum.**—Thread-worms may be responsible, or some unhealthy condition of the rectal mucous membrane, such as anal fissure, or a rectal polypus. Pruritus ani is generally added to pruritus vulvæ in these cases.

(*b*) **From the Bladder.**—In cases of vesical irritability with frequent micturition pruritus may be present as a reflected neurosis. Bladder sedatives, such as hyoscyamus and belladonna, are then indicated.

(*c*) **From the Uterus.**—Pregnancy sometimes is associated with pruritus, even when there is not marked leucorrhœa.

The treatment of pruritus will depend on the causal condition, and this should, therefore, be always carefully inquired into.

CHAPTER X

DISEASES OF THE VULVA—(*Continued*)

V. MORBID CONDITIONS OF HYMEN, CLITORIS, URETHRAL ORIFICE AND PERINEUM.

The Hymen.—Normally, the hymen, when stretched, forms a diaphragm with an eccentric perforation situated nearer the anterior than the posterior margin. It sometimes presents slight variations in the size and position of the aperture, which are unimportant. A condition has been described under the name *cribriform hymen*, in which there are several apertures instead of one.

Variations in Structure.—It may be very thin and easily torn, or dense and unyielding, requiring division before coitus can take place; or thick and fleshy. It may be unusually distensible and yielding, so that a finger or small speculum may be introduced, or coitus occur, without rupture. When the legs are separated, the hymen may become so tense that the finger cannot be introduced, whilst it may pass easily when the thighs are approximated (Brouardel).

This small structure has therefore an important medico-legal bearing. A permeable hymen, or one with a fringe-like margin, must not be taken as a certain indication that intercourse has taken place, and on the other hand an unruptured hymen is not positive proof of virginity.

Treatment.—A rigid or contracted hymen may require dilatation or division to allow of coitus.

Carunculæ hymenales result from the rupture of the hymen during coitus. They consist of portions of the hymen which are left between the radiating tears, and touch one another, so that in the undisturbed condition the hymen may still appear intact. When everted they resemble the petals of a daffodil.

Carunculæ myrtiformes are due to more extensive stretching, bruising, and occasionally sloughing of the intermediate portions of the hymen during childbirth. They appear as isolated nodules round the hymeneal margin.

Cysts.—Small cysts lined with epithelium sometimes form in the tissues of the hymen.

Painful caruncles of the hymen are a frequent source of vaginismus and dyspareunia. They appear as a series of congested spots, resembling small recent bruises, and exceedingly sensitive, situated at the hymeneal margin. They occur principally in cases of kraurosis vulvæ, and are often found associated with urethral caruncle. For treatment see Kraurosis.

Imperforate hymen is considered under the head of Atresia Vaginæ (p. 52).

The rupture of the hymen is generally attended by pain of short duration and slight bleeding. The latter may occasionally be so profuse as to demand surgical intervention, and may even be fatal.

MORBID CONDITIONS OF THE CLITORIS.

Inflammation.—This may form part of a general vulvitis, or it may be due to the development of a venereal sore or phagedenic ulcer. In other cases the prepuce becomes adherent to the glans of the clitoris, and the pent-up secretion (smegma) sets up irritation which may lead to ulceration or a small abscess. The treatment of this condition consists in separating the adherent margins of the prepuce, and keeping the parts clean and dry.

Elephantiasis is usually associated with elephantiasis vulvæ. Occasionally the clitoris is affected independently of the labia, and forms a tumour hanging down as a large mass in front of the vulva.

Carcinoma.—This is a somewhat rare affection of the clitoris. The prognosis after removal is favourable, as the glands are affected very late, and there is but little tendency to deep or extensive spreading.

Treatment.—This consists in complete extirpation of the clitoris and its crura.

Urethral Caruncle.—This is a small red fleshy growth situated on the posterior aspect of the urethral meatus.

Pathology.—It usually occurs at or after middle life. It is often associated with kraurosis vulvæ, and in these cases it is probably due to the atrophic changes which characterize that condition; for there is often a striking similarity between some kinds of urethral caruncle and those red and tender spots round the hymeneal margin which occur so constantly in kraurosis.

In other cases, however, there is no accompanying kraurosis, and the caruncle is then usually larger and more prominent, and is due in all probability to changes taking place in Skene's ducts, two small recesses in the floor of the urethra. It is possible that these changes have an infective origin, but their pathology is not quite clear. In some cases the structure of the caruncle is suggestive of adenoma; in others the principal feature consists in the increase of thin-walled vessels like those seen in piles, and has suggested the name urethral hæmorrhoid. The view that a caruncle is due to changes occurring in the urethral ducts receives strong support from the fact that the caruncle is invariably situated on the floor of the urethra in the situation of the ducts.

Symptoms and Signs.—The patient complains as a rule of pain and tenderness at the meatus, with a burning sensation on passing water, and sometimes of frequency of micturition. Occasionally the caruncle gives rise to bleeding and pain on coitus. A caruncle is readily recognised on inspection, presenting the characters above described. It occasionally extends from one to two centimetres up the urethra.

Treatment.—The simplest plan is to remove the small growth with scissors, or to destroy it with the thermo-cautery under an anæsthetic.

THE PERINEUM.

This term is applied to the cutaneous and subcutaneous tissues intervening between the fourchette and the anterior margin of the anus. Its centre corresponds to what is known in the male as the central point of the perineum. On section (Fig. 1) it is triangular, and marks the meeting of the sphincter of the anus, the transverse perineal and the rudimentary bulbo-cavernosus muscles. It also contains a strong meshwork of connective tissue, and fibres of elastic tissue intermingle with the confluent attachments of the muscles mentioned above.

Ruptured Perineum.—By this is meant a tear extending through the lower part of the posterior vaginal wall and the perineum ; it may extend into the anus.

Causes.—It is almost invariably due to parturition, but occasionally it is produced by surgical procedures, such as the extraction of large uterine polypi or foreign bodies from the vagina.

When it occurs during labour, the predisposing circumstances are :

1. Disproportion between the size of the head and the genital passages.

2. Precipitate labour.

3. Want of care in the delivery of the head or shoulders.

4. Certain malpresentations, especially the unreduced occipito-posterior.

5. The use of instruments. The application of forceps does not, however, necessarily endanger the perineum; on the contrary, properly used, it may lessen the risk of injury by controlling and guiding the expulsion of the head.

6. Morbid conditions of the perineum: as undue softness and friability, which may be due to long-continued pressure of the child's head; undue rigidity; or diminution of elasticity as the result of chronic inflammation.

7. The risk is greater in primiparæ, and increases with the age of the primipara.

Varieties.—The following are met with:

1. *Partial.*—Little more than the fourchette may be involved; or the perineum may be divided to a greater or less extent, but the sphincter ani remains intact. Within the vagina the tear nearly always occurs to one or other side of the posterior vaginal column. The thickness and firmness of this structure prevent a median split.

2. *Complete.*—The laceration is anteriorly the same as in the partial variety, but posteriorly it extends through the sphincter ani, and may pass for some distance up the anterior wall of the rectum.

3. *Central.*—In this kind, which is uncommon, the anterior part of the perineum remains intact, but a tear occurs at some place between the fourchette and the anus. It is due, as a rule, to long-continued pressure of the child's head, whereby the vitality of the thinned-out perineum is so impaired that it gives way at its most prominent point. Or perforation may occur later from gangrene, a vagino-perineal fistula thus

resulting. Cases have also been recorded in which the central tear was so large that the child was born through it, passing out behind the posterior commissure of the vagina.

Results of Ruptured Perineum.—When the rupture is partial, there is a tendency to prolapse of the vaginal walls, especially the posterior; this may be followed by a more complete hernia of the pelvic floor. There is also inability to retain a pessary when this is indicated on account of prolapse or retroversion.

When the rupture is complete, in addition to the consequences mentioned above, there is diminution or loss of control over the rectum, causing incontinence of fæces and flatus.

Treatment.—When a perineum becomes torn during parturition it should always be repaired at once; two or three sutures will usually suffice; as a rule, union readily occurs, especially when the tear results from too rapid delivery, as it is consequently fairly clean. On the other hand, when the tear is due to long delay, rendering the perineum friable, the edges are swollen and bruised, and sloughing may occur instead of union. But whatever the nature of the tear, repair should always be attempted. When not seen till some time after, secondary perineorrhaphy is required.

CHAPTER XI

DISEASES OF THE VULVA—(*Continued*)

VI. TUMOURS AND CYSTS.

(*a*) **Tumours.**—The following are met with in the vulva: lipoma, fibroma, myxoma, angeioma, papilloma, sarcoma, and carcinoma.

Lipomata arise in the labia majora, and sometimes in the mons veneris. They are usually sessile,and seldom attain a large size. They can be left alone unless they cause discomfort, and then they should be enucleated.

Fibromata are rare, and seldom large; but occasionally a fibroma may form a large pedunculated tumour, causing dragging pain by its weight. These tumours are easily removed.

Myxomata form soft pedunculated masses, arising generally from the labium majus (Fig. 26). A rare form of multiple myxomata affecting the vestibule and urethra is here shown (Fig. 27). The pedicle is nearly always narrow. Sometimes the skin covering them is deeply pigmented. They can be removed if they produce discomfort.

Angeiomata are sometimes seen as nævi, mostly in children; more rarely a plexiform angeioma occurs. A nævus seldom requires to be interfered with. A plexiform angeioma is best treated by electrolysis.

Papillomata or warts are common; the ordinary simple wart may be present, but more often papillomata are associated with irritating discharges in cases of gonorrhœa.

They are usually pedunculated, but may be sessile, and a considerable area may be covered by them.

Treatment.—Gonorrhœa, if present, must be energetically treated, and the vulva must be kept scrupulously clean. considerable improvement may usually be effected by the use of mercurial lotion and ointment. If the papillomata persist they should be snipped off, and their bases touched with nitric acid or solid nitrates of silver.

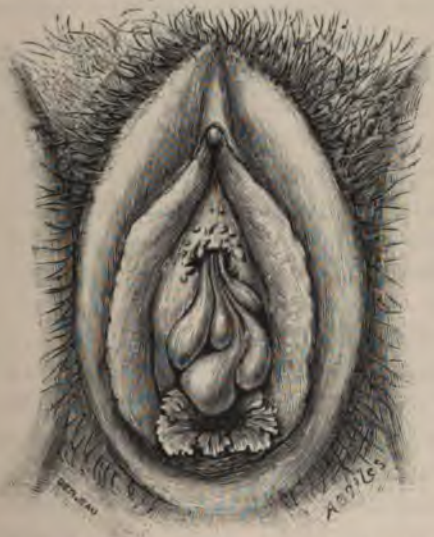


FIG. 27.—MULTIPLE MYXOMATA OF THE VESTIBULE.

Sarcoma is only rarely met with in the vulva, and it usually takes the pigmented form (melanoma). As a rule the growth is disseminated over other parts of the body, and the outlook is very unfavourable. A localized solitary sarcoma should be freely removed.

Carcinoma of the vulva generally attacks the clitoris or one of the labia majora, and is of the squamous-celled species. When the clitoris is involved this structure becomes replaced by a mass which may attain the size of a small egg. The surface is usually ulcerated in parts. On the labia majora carcinoma commences as a wart-like structure which enlarges rapidly and soon breaks down on the surface, forming an ulcerating mass discharging a fœtid secretion. Carcinoma has been known to arise in a vulva affected with kraurosis, and we have met with an example. The glands in the inguinal region become affected, though they may remain free for a relatively long time. Once they are involved the swelling in the groins rapidly increases, and spreads to the interior of the pelvis. Death comes about from exhaustion and distress induced by pain, frequent bleedings, and mental anguish. Sometimes a large vessel is opened by ulceration, and rapid death from bleeding ensues.

Diagnosis.—This is usually easy. The conditions most likely to be mistaken for it are :

(*a*) Papillomata, especially if inflamed or ulcerating.

(*b*) Hard chancre. This forms a single ulcer, with hard base, and no tendency to spread. The inguinal glands are small, separate, and amygdaloid.

(*c*) Soft chancres. These are multiple ; there is no induration ; and they heal rapidly under proper treatment.

(*d*) Lupus, which is distinguished by alternations of tubercular masses, ulcers with bluish undermined edges, and contracting cicatrices. There may also be tracts of healthy skin between the ulcers, whilst the cancerous ulcer is compact and shows no tendency to heal.

(*e*) Sloughing phagedena. This appears as a breaking-down abscess with gangrenous walls and free secretion of pus. There is no induration, and the history of venereal infection points to its true character.

Treatment.—If seen early enough free excision is the proper treatment, and the prognosis is generally good. When practicable the cut edges of the vagina should be sutured to the skin at the margin of the wound; the urethral mucous membrane should be similarly treated when the growth surrounds the urethral meatus. When the clitoris is alone affected, complete extirpation of this organ is necessary.

If the growth has extended deeply into the vagina, or has spread extensively, palliative treatment is alone possible. The discomfort may be relieved by frequent antiseptic irrigations and dressings smeared with eucalyptus and vaseline; anodynes, of which morphia subcutaneously administered is the best, are usually required to relieve pain.

Glandular Carcinoma.—This is a very rare affection of the vulva; it arises in Bartholin's gland and involves the labial tissues, infects the lymph-glands, disseminates, and recurs after removal. Structurally it mimics the acini of the gland.

(*b*) **Cysts of the Vulva.**—These are of four species: mucous, sebaceous, cysts of Bartholin's glands, and hydrocele of the canal of Nuck.

Mucous cysts are found principally on the inner surface of the labia minora, and seldom attain a large size. They should be opened, and if they recur the cyst-wall should be dissected out.

Sebaceous cysts resemble similar cysts in other regions. The small black spot marking the orifice of the duct will generally give the clue to their origin. They are liable to be infected by vaginal discharges, and then usually suppurate. An abscess in a sebaceous gland requires free incision; an enlarged gland requires excision.

Cysts of Bartholin's gland usually arise in the duct, but in chronic cases the gland may enlarge. Sometimes the occlusion is not complete; the duct may then become dilated for a day or two, and this is followed by a sudden discharge of mucous fluid. In the case of complete retention the fluid may be watery or viscid; occasionally it resembles the contents of a ranula.

Symptoms and Course.—The patient complains chiefly of discomfort, sometimes of pain. The inconvenience may be felt in walking or sitting, whilst the pain may be a constant aching due to distension, or take the form of dyspareunia.

An inflammatory condition may be present from the first as a complication of gonorrhœa. Pus is then found exuding in small drops from the duct orifice; later this tends to close up, and an abscess results.

A simple cyst is fairly well differentiated from the surrounding structures; but if suppuration sets in, the cyst-walls become thickened and infiltrated, and the distinction between them and surrounding tissues is obscure. When an intermitting cyst is examined during its stages of collapse, the gland itself may be felt, between the finger in the vagina and the thumb outside, as a little mass the size of a pea or small bean.

Diagnosis.—The cyst presents a characteristic pear-shaped swelling, occupying the most dependent part of the labium majus, the narrow end of the swelling being uppermost. It is only when it gets large that it involves the upper part of the labium. In chronic cases the orifice is readily seen as a small pit in the angle between the hymen and the labium minus (Fig. 28). The lesser lip is not affected when the cyst is small; when large, it is stretched and flattened over the swelling. Suppuration is readily recognised by the much greater pain, the redness of the skin and mucous membrane, and the heat of the part.

Three conditions require to be differentiated from a Bartholinian cyst or abscess:

(*a*) *Hæmatoma.*—The swelling is more uniform through the labium majus; it feels more doughy, and there is commonly a history of injury or recent parturition. A hæmatoma may affect the lesser lip alone.

(*b*) *Inguinal Hernia.*—This appears at the upper end of the greater lip, and tends to disappear when the patient is lying down; there is an impulse on coughing, and it may be resonant. In any case, there is not a free flattened space between the swelling and the inguinal opening.

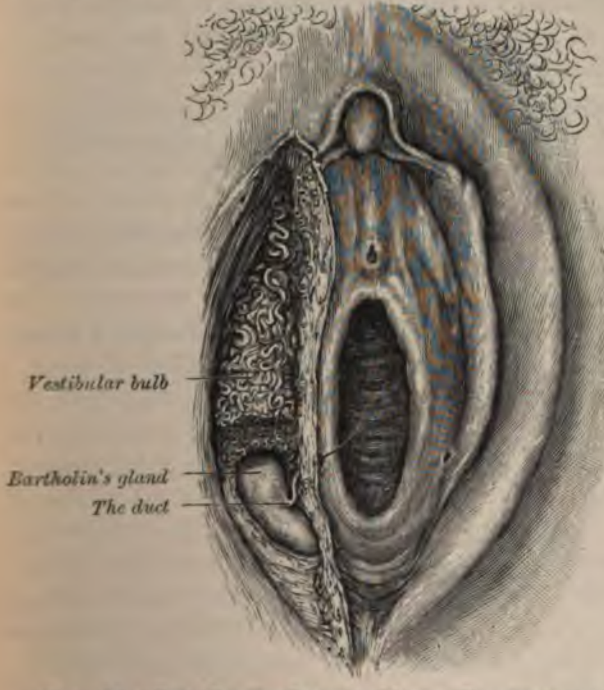


FIG. 28.—THE RIGHT LABIUM MAJUS DISSECTED TO SHOW BARTHOLIN'S GLAND AND ITS DUCT (SEMI-DIAGRAMMATIC).

(*c*) *Hydrocele of the Canal of Nuck.*—In this case the swelling occupies the upper or middle part of the labium, the lower end being free.

Treatment.—The only satisfactory way of dealing with a Bartholinian cyst is to dissect it out.

Hydrocele of the Canal of Nuck.—This condition is analogous to encysted hydrocele of the cord in the male, and is similarly produced. That is, the funicular pouch of peritoneum, instead of becoming obliterated, remains patulous, although its abdominal end is sealed, and the resulting cavity becomes distended with fluid. The swelling occupies much the same position as an inguinal hernia. There is no impulse on straining or coughing, nor is the swelling affected by the position of the patient. It is often difficult, and sometimes impossible, to distinguish between hydrocele of the canal of Nuck and hydrocele of an old hernial sac. This is a matter of trifling importance, for the treatment is the same in both conditions.

Treatment.—When a hydrocele of the canal of Nuck causes inconvenience, it should be removed by operation.

CHAPTER XII

DISEASES OF THE VAGINA

AGE-CHANGES, DISPLACEMENTS, INJURIES, FOREIGN BODIES AND FISTULÆ.

Age-changes in the Vagina.—In the child the vagina forms merely a transverse slit. The walls are thrown into numerous close folds, mainly transverse, and more marked at the side.

After puberty the vagina becomes larger, the widening affecting especially the upper part. There are, however, considerable variations in individual cases; in some the vagina remains nearly the same width above as below; in others, the capaciousness superiorly forms a marked contrast to the narrow entrance.

After marriage the folds become somewhat flattened out, and the whole vagina becomes dilated, owing to the capacity of its walls for stretching.

Childbirth accentuates the changes, and after repeated labours the folds become almost obliterated, and the orifice may remain gaping, owing to stretching or rupture of the sphincter vaginæ. At the same time the walls become lax, and tend to protrude through the vulvar orifice.

With the onset of the menopause, atrophic changes set in. The walls now become quite smooth on the surface, and the lumen becomes contracted, especially at its upper portion, with the result that the fornices are obliterated, and the whole vagina assumes a conical form, with its apex upward. At the summit of the cone the cervix forms a small projection; or, this also becoming atrophied, the vaginal vault becomes almost pointed, with a small depression at its apex representing the external os, and barely admitting a sound or a probe.

DISPLACEMENTS OF THE VAGINA.

These are commonly associated with displacements of the uterus, the whole forming the typical "hernia of the pelvic floor"; but as the vagina may be affected principally, or alone, we shall here describe the two chief types—viz., cystocele and rectocele.

Cystocele.—This is really a hernia of part of the bladder into the vagina, the vaginal mucous membrane forming its outer covering; or it may be expressed as a deflection of the vesico-vaginal septum toward the vagina. It forms a smooth, rounded swelling, which bulges through the vulvar aperture when the patient coughs or strains. If the lower part of the anterior vaginal wall is mainly affected, the swelling is more properly called a *urethrocele*. In this case it is smaller, and the thickened urethra can be felt as a median projection through the vaginal wall.

Rectocele.—This is a hernia of the rectum into the vagina, covered by the mucous membrane of the posterior vaginal wall. It forms a swelling resembling that produced by a cystocele, except that it is on the posterior aspect of the vagina. If the finger be introduced into the rectum it can be passed into the pouch in the vagina, and similarly a sound introduced into the bladder can be passed into a cystocele.

A rectocele is nearly always associated with a deficient perineum; and, further, cystocele and rectocele are often found together. When this is the case the vulvar outlet, when the patient strains, is occupied by two smooth swellings placed one in front of the other; between them the finger can be passed up to the cervix (Fig. 29).

Causes.—The direct cause of these conditions is a relaxation of the tissues forming the vaginal walls. This, again, is brought about mainly by parturition. Women who have borne a great number of children are the principal sufferers, and most cases come under observation between the ages of thirty and forty-five. After the menopause the general tendency to atrophy of the genital passages counteracts in some measure the laxity of the vaginal walls.

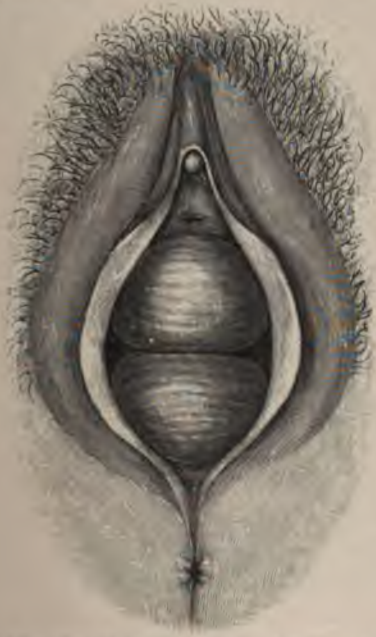


FIG. 29.—CYSTOCELE AND RECTOCELE.

The mechanism of the displacement differs slightly in the production of a cystocele and a rectocele.

Cystocele.—It will be remembered that the anterior vaginal wall is attached more firmly below, opposite the pubes, than above; in the case of a tedious labour, when a large head presses for some time on the vaginal walls, the anterior wall is forced down, and its attachments to the pubes are loosened and may even be separated. After a first confinement the parts may regain more or less their normal fixity. But after repeated labours, especially if difficult, the lower part of the anterior vaginal wall remains permanently loosened from its pubic attachment, and tends to prolapse whenever the intra-pelvic pressure is increased, as when the bladder is full, when the patient strains at stool or coughs, and in some cases when she stands.

A cystocele may arise in another way. Owing to the fact that the principal attachment of the anterior vaginal wall is at its lower end, it follows that if the uterine supports be loosened, and the uterus comes to lie low in the pelvis, the upper and lower ends of the anterior vaginal wall are approximated. The intervening part bulges downward, especially when the bladder is full, and in this way also a cystocele is produced.

Rectocele.—The posterior vaginal wall is mainly attached above, being held in place by the utero-sacral folds. When these are lengthened and rendered lax, as by the dragging of a heavy uterus or as the result of repeated labours, the posterior vaginal wall hangs lower, and may bulge in the form of a rectocele. The tendency to this is greatly increased if the perineum be torn, as the inferior support is then lost. Indeed, a slight degree of rectocele is possible when the perineum is torn, even if the utero-sacral folds remain at a normal tension, and the uterus is in its proper position. But it is evident that, as long as the superior attachment of the posterior wall remains firm, there can be no great prolapse of that wall, unless it has become elongated, as may occur after repeated deliveries.

In accordance with the above considerations we find, first, that cystocele is more common, and usually more marked, than rectocele ; secondly, that prolapse of the uterus strongly predisposes to prolapse of the vaginal walls.

Symptoms.—The patient complains principally of "bearing down," and of something protruding from the vulva. In out-patient practice the statement made is often that "the womb comes down." The feeling of weight and dragging is aggravated after long standing or walking, and during defæcation. With cystocele and urethrocele there is often frequency of desire to pass water. On making an examination, the vaginal outlet is seen to be occupied by one or two swellings according as one or both conditions exist. In recent cases the mucous membrane retains its normal character ; in those of long standing it may be thickened and hard, approaching the appearance of the skin. The swelling is distinguished from a protruding cervix by the absence of the os externum and by the fact that it has an anterior (cystocele) or a posterior (rectocele) attachment. A finger passed through the anus into the posterior swelling, or a sound passed through the urethra into the anterior one, will confirm the diagnosis. The cervix uteri is generally met with low down in the vagina.

Treatment is of two kinds—palliative and curative.

(*a*) *Palliative treatment* consists in the employment of pessaries ; of these, the most useful is the rubber ring. When the perineum is much torn, it is often found that no ring will remain in position, unless so large as to cause harmful pressure. An instrument of the cup-and-stem type may be used, or a ring with a Y-shaped stem, the limbs of the Y being attached at the ends of a diameter of the ring. Perineal bands are fastened to the lower end of the stem. These plans are, at the best, faulty, and when a simple ring cannot be retained it is much better to resort to operation unless there be some contra-indication.

(*b*) *Curative or Radical Treatment.*—For rectocele, a perineorrhaphy may be performed, either alone or associated with posterior colporrhaphy (colpo-perineorrhaphy). This will often allow of the wearing of a ring, even if the operation does not entirely cure the prolapse.

For cystocele many varieties of anterior colporrhaphy have been devised (see Colporrhaphy). In obstinate cases some more serious measure may be tried, such as vaginal or ventrofixation (see Hysteropexy). For cystocele associated with retroversion of the uterus, vagino-fixation is said to answer well, for the two opposing tendencies—of the uterus to fall back, and of the vaginal wall to fall down—counteract one another (Edge).

Vaginal Hernia (*Enterocele*).—A rare form of hernia sometimes occurs in which the uterus and the lower part of the vagina retain their proper position, whilst the peritoneal pouch behind the uterus bulges into the vagina and is occupied by coils of intestine. It is distinguished from the conditions just described by the following points: (1) The swelling is not continuous, anteriorly or posteriorly, with the margin of the vulva; (2) the finger cannot be passed into the pouch through the anus nor can a sound be passed into it through the urethra; (3) the cervix uteri is found high up.

A vaginal hernia has been mistaken for prolapse, polypus, and inversion of the uterus.

Injuries.—Serious and even fatal injuries of the vagina have followed rape on adult women as well as children; severe lacerations have been caused during willing coitus, due to unusual size of the penis, undue narrowness of the vagina, or even awkwardness on the part of the man. First coitus sometimes causes alarming and even perilous bleeding, especially when the laceration of the hymen extends to and involves the vulva or the vaginal wall.

Fatal peritonitis has followed the forcible introduction of foreign bodies. Women sometimes injure themselves fatally by introducing pointed instruments for the purpose of inducing abortion, or during fits of sexual frenzy.

The upper part of the vagina may be lacerated by the careless use of instruments in operations on the uterus and during instrumental delivery, or by the child's head in a long second stage of labour. In this way the broad ligament (mesometrium) may be opened up and pelvic cellulitis result. When free bleeding results, it may be erroneously thought to be derived from the cavity of the uterus. As a rule the bleeding stops readily under the influence of a hot vaginal douche (115° F.). If it persists, the lacerations may require to be repaired. A serious form of laceration sometimes occurs during labour, the recto-vaginal pouch being opened up. This may occur from violent uterine contractions in cases where the pelvis is narrow or there is other obstruction to delivery; it has also been produced during the introduction of the forceps, perforator, or cephalotribe. Coils of intestine may protrude through the gap, and even hang out from the vulva. The accident is generally fatal.

Treatment.—In recent injuries the blood clot should be removed, and search made for bleeding vessels, which should be secured and ligatured. Capillary oozing is best restrained by careful packing with gauze.

Foreign Bodies.—The vagina, like the other accessible cavities of the body, is liable to have foreign bodies introduced into it. Little girls from sheer curiosity insert hairpins, pebbles, seeds, fruit-stones, pencils, etc. Older girls introduce sponges, cotton-wool, and the like, with the hope of preventing conception from illicit intercourse.

Pomade-pots, pewter pots, cotton-reels or spools, candle-extinguishers, and small indiarubber balls have been removed from the vaginæ of matrons; some of them were introduced to prevent pregnancy, others to act as supports to prolapsed wombs. Pessaries of extraordinary shape, size, and complexity have been introduced by obstetric physicians and forgotten till urinary fistulæ or stinking discharges have led to examination. Brutal men when rioting with low drunken women have thrust into the vagina pipe-bowls, thimbles, clock-weights, or pieces of metal.

The vagina has served as a repository for stolen property—*e.g.*, gems, bank-notes, jewellery, and pocket-books.

Among odd things the following deserve mention: A cockchafer beside a pomade-pot (Schroeder); a rose-bud; a small bust of Napoleon the Great; and cylinders of inverted pork-rind. A woman was admitted into the cancer ward of the Middlesex Hospital with a certificate of "stone cancer" of the uterus. Examination proved the alleged cancer to be a piece of brick. In the vagina of a feeble-minded patient of sixty the following articles were found: a large cork, a thimble, a rag, a needle-case, and a bootlace (Monod).

When a healthy young woman is found to be suffering from a stinking vaginal discharge, it is exceedingly probable that she has a foreign body in the vagina.

Treatment.—Foreign bodies should be removed as soon as discovered. When long retained it is usually necessary to obtain the advantage of an anæsthetic.

Fistulæ.—As the vagina is placed between two hollow viscera, the bladder and rectum, it is not surprising that fistulous passages are occasionally formed between them. Fistulæ are caused by sloughing of the vagina during protracted labour; injuries from obstetric implements: ulceration due to pessaries and other foreign bodies. They also occur in the late stages of carcinoma of the cervix uteri, vagina, and rectum. Occasionally they are due to ulceration of the bladder, set up by vesical calculi formed around foreign bodies introduced into the bladder.

Vaginal fistulæ, vesical, ureteral, and rectal, occasionally follow vaginal hysterectomy; usually, however, they are merely temporary.

Vaginal fistulæ are of four kinds: (1) Vesico-vaginal; (2) urethro-vaginal; (3) uretero-vaginal; (4) recto-vaginal. The names are sufficient to indicate their positions. Utero-vesical fistulæ may also be considered here.

Symptoms.—In the case of a vesico-vaginal fistula the patient complains that she cannot hold her water. Some urine may collect in the bladder and be voided periodically if the fistula is small; otherwise the urine escapes from the vagina as rapidly as it enters the bladder. The vulva and vagina are inflamed and excoriated by the constant wetting, and sometimes a phosphatic incrustation forms.

If the fistula be rectal, great discomfort and distress are caused by the passage of fæces and flatus by the vagina, though, if the fistula be small, the fæces may be prevented by their semi-solid consistence from entering the vagina.

The Methods for the Detection of Vaginal Fistulæ.—The persistent and involuntary escape of urine from the vagina is sufficient indication of the existence of a urinary fistula, but it is not always a simple matter to localize its precise position.

To determine this it is advisable to put the patient in the lithotomy position, and expose the parts with a duckbill speculum introduced into the vagina in a good light. A vesico-vaginal or a urethro-vaginal fistula rarely gives rise to difficulty, and the pink everted edges surrounding its vaginal orifice soon lead to its detection. When there is difficulty in finding it, the vaginal mucous membrane should be cleared of mucus, and warm milk injected into the bladder through a catheter in the urethra; it will then dribble through the fistula.

Injections of milk are very serviceable for the detection of uretero-vaginal fistulæ. In this case, when milk is injected into the bladder, none escapes into the vagina; yet, during the course of the examination, urine has continued to escape into the vagina. This test is necessary even when the orifice of the fistula is clearly visible. In this form of fistula, if the urine which escapes involuntarily from the vagina is collected, measured, and compared with that voided from the bladder, it will be found that the two quantities equal each other.

In the case of a utero-vesical fistula the urine will be seen escaping from the cervical canal of the uterus; when milk is injected into the bladder some of it escapes down the cervical canal; this is conclusive.

Treatment.—Persistent vaginal fistulæ of all kinds require operative treatment.

CHAPTER XIII

DISEASES OF THE VAGINA—(*Continued*)

VAGINAL INFECTION AND THE VAGINAL SECRETIONS.

GONORRHŒA and sepsis play a very important part in the production of vaginitis. For the better appreciation of their influence, we must make some preliminary observations on the bacteriology of the normal vaginal and uterine secretions.

The Normal Vaginal Secretion.—In the following remarks the excellent account given by Döderlein will be followed.

Origin.—The vagina contains no glands, and some observers have consequently inferred that the secretion found in the vagina is derived in every case either from the cervical or Bartholinian glands. This view is disproved by the following considerations: First, the cervical canal is normally occupied by a tenacious plug of mucus, which shuts off the cervical from the vaginal canal; secondly, the Bartholinian glands usually secrete very little fluid, and the ducts open on the outside of the hymen; thirdly, in closed vaginal cysts a typical vaginal secretion is found; fourthly, the cervical and vaginal secretions present markedly different characters.

The vaginal secretion is derived from the shedding of squamous epithelium together with the exudation of some lymph-serum. Normally, it forms a thin coating on the surface of the vagina.

Characters.—It is a rather thin opalescent fluid, devoid of viscidity, and sometimes, when abundant, forming a white flocculent and curdy matter. It gives a strongly acid reaction, due to the presence of lactic acid. Estimated quantitatively, the acidity is equivalent to 0·4 per cent. of sulphuric acid, or 0·9 per cent. lactic acid. In the new-born the action is neutral; in the healthy virgin it is acid; in normal pregnancy the acidity is greater; whilst in pathological conditions the reaction is feebly acid, neutral, or even alkaline.

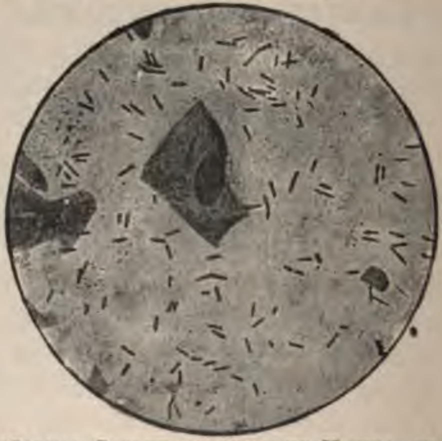


Fig. 30.—Normal Secretion from the Vagina, showing the Vagina Bacillus (Döderlein).

The acidity disappears during and for some days after menstruation, and for five or six weeks after normal labour. Examined microscopically, the vaginal secretion in the new-born contains only squamous epithelium. In the virgin and in normal pregnancy there is constantly found, in addition, the *vagina bacillus* (Fig. 30); whilst in a certain percentage of cases a fungus is found, the *Monilia candida*. The vagina bacillus and the fungus are invariably absent from pathological secretions.

The *vagina bacillus* belongs to the group of anaerobic bacilli. It may be cultivated on agar or gelatin, or in bouillon, blood-serum, or milk. It requires moisture and warmth equivalent to the body temperature. It occurs in the form of short straight rods. As the result of pure cultivations lactic acid is invariably produced, equivalent quantitatively to 0·5 per cent. sulphuric acid, which corresponds to 1·125 per cent. lactic acid.

Role of the Vagina Bacillus.—To this bacillus is due the presence of lactic acid in the vaginal secretion, as indicated by the fact that when the bacilli are absent, as in the new-born and during the puerperium, the reaction of the secretion is always neutral. In its presence saprophytes and pathogenic micrococci, such as the streptococcus and staphylococcus, are unable to develop, and before long perish. When the vagina bacillus is absent, as in the lochial secretion, both saprophytes and staphylococci are able to flourish. The *monilia* is a harmless organism which can only grow in the presence of the vagina bacillus—that is, in the healthy vaginal secretion.

The antagonism between the vagina bacillus and pathogenic organisms is illustrated by the following experiments described by Döderlein:

(*a*) A pure cultivation of the vagina bacillus on peptone-agar of three days' growth was inoculated with a cultivation of the *Staphylococcus pyogenes aureus*. The staphylococci were soon destroyed. When, however, the two bacilli were inoculated on agar at the same time, the vagina bacillus perished, showing that abundant products of the growth of the latter are required to destroy the staphylococcus.

(*b*) The vagina of a virgin was inoculated with a bouillon culture of *Staphylococcus pyogenes aureus*. After six hours an abundant cultivation of staphylococci was obtained therefrom. After twenty-four hours only a few colonies were found; these further diminished on the second and third days, and by the fourth day the staphylococci had been quite destroyed in the vaginal secretion.

As a result of the protective influence of the vagina bacillus, it happens, as Winter has shown, that when pathogenic organisms are found in the normal vaginal secretion they are always in a condition of weakened virulence.

The normal cervical secretion consists almost entirely of mucus, in which are found entangled a few columnar cells derived in part from the surface epithelium and in part from that lining the glands. It is in consequence viscid and tenacious, so that a plug of it filling up the external os is often very difficult to dislodge. Its reaction is alkaline or neutral, and it contains no micro-organisms.

Pathological Vaginal Secretion.—This is thin, yellowish-white, or, if pus be mixed therewith, greenish. It may be so abundant as to flow spontaneously from the vagina, giving all the symptoms characteristic of leucorrhœa. Its reaction varies from faintly acid, through neutral, to strongly alkaline. Examined microscopically, it is found to contain epithelial débris, and often pus-cells.

Both in cover-glass preparations and by cultivation it is found to contain saprophytic bacilli and micrococci—viz., staphylococci, and often streptococci. The vagina bacillus and the monilia fungus are never present.

A pathological vaginal secretion may be regarded as a favourable cultivation medium for pathogenic organisms. Döderlein performed eighteen inoculation experiments with pathological vaginal secretions on rabbits, and in every case septicæmia resulted.

The transition from a normal to a pathological secretion may be brought about in two ways:

First, by mere functional increase in the amount of secretion, such as arises from sexual excesses. Thus in thirty prostitutes examined by Döderlein the secretion was not once found to be normal, even when there was no specific gonorrhœal infection. Masturbation, the wearing of rubber pessaries, frequent and purposeless vaginal irrigations, and the introduction of alkaline substances, such as soap, may have the same effect.

Secondly, through pathological organic changes, such as are found in endometritis, adenomatous disease of the cervix, vaginitis, and cancer.

Besides the organisms of sepsis there is sometimes found a specific micro-organism, the gonococcus of Neisser (Fig. 31).

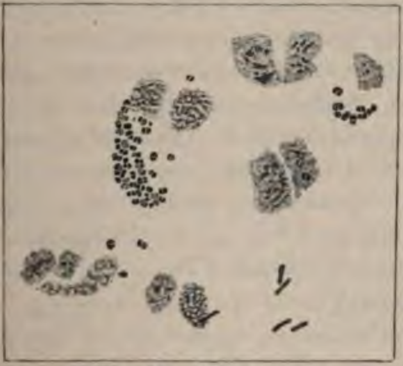


FIG. 31.—GONOCOCCI.

It must be remembered, however, that, as Bumm has pointed out, the vagina often escapes gonorrhœal infection, owing to the resistance offered to the entrance of gonococci by the stratified squamous epithelium, whose superficial portion is hard and horny. But the disease readily attacks the urethra and the delicate columnar epithelium of the cervix, as well as the ducts of the glands of Bartholin.

In cases of gonorrhœa the vaginal secretion is therefore usually altered indirectly by the admixture therewith of the unhealthy cervical secretion, which is abundant, alkaline, purulent, and consequently albuminous, and the vaginal secretion accordingly acquires these characters. The vagina bacillus perishes under these circumstances, and a favourable soil is provided for the development of the pathogenic germs previously described. The actual inoculation of these pathogenic germs may occur during menstruation, sexual intercourse, gynæcological manipulations, and parturition; in the latter case not only through vaginal examinations and operative procedures, but also through traumatism incident to labour.

The micro-organisms found in the vagina acquire a special importance from the point of view of the etiology of puerperal infection. The vaginal discharges of pregnant women have formed the subject of numerous observations, and the results have been very contradictory. One class of observers, such as Gönner, Thomen, Samschin, Krönig, Menge, and Whitridge Williams, believe that pathogenic organisms are very rarely found; others regard them as relatively frequent. Thus, streptococci, staphylococci, and *Bacilli coli* have been found in the following proportions of frequency: Burckardt, 4 per cent.; Steffeck, 4 per cent.; Döderlein, 4½ per cent.; Burguburu, 8½ per cent.; Vahle, 10 per cent.; Witte, 12½ per cent.; Kottmann, 13 per cent.; Winter, 15 per cent.; Williams (earlier observations), 20 per cent.; and Walthard, 27 per cent. The difference in these results is explained by the supposition that the latter observers did not succeed in avoiding contamination from the vulvar secretion, for many pyogenic organisms are frequently found there. Thus in twenty-five cases Williams found them in 76 per cent. in the vulvar secretion, in 12 per cent. in the vaginal secretion, as collected through a speculum; but not in one case when the vaginal secretion was obtained by means of a special tube, which avoided all contamination from the vulva. In 117 cases examined by the latter method, the streptococcus was not once present, and the staphylococcus only in two cases. Consequently, the normal vaginal secretion of pregnant women must be regarded as practically free from pyogenic organisms.

An important practical deduction to be drawn from these considerations is, that in cases in which the vaginal secretion departs from the normal type special care should be taken to disinfect the vagina before resorting to any intra-uterine manipulations, even the passage of the sound, lest the uterine cavity, previously unaffected, be inoculated with septic organisms.

Having thus briefly reviewed the pathogenesis of vaginal infection, we may enumerate the principal morbid conditions which may result therefrom—viz., vaginitis; endometritis, of both cervix and body; salpingitis, catarrhal and purulent; septic peritonitis; pyocolpos and pyometra; and pelvic cellulitis. These results may follow either from sepsis alone, or from sepsis complicated by gonorrhœa.

In vulvo-vaginitis of young girls the gonococcus is frequently found in the vagina, the epithelium being at that age less resistant. In girls and in adults gonococci in the vagina diminish in number as the disease becomes more chronic.

In cases of puerperal infection, many pathogenic organisms have been found in the lochia and in the uterus—viz., the *Streptococcus pyogenes*, *Staphylococcus pyogenes aureus* and *albus*, *Bacillus coli communis*, gonococcus, tetanus bacillus, Klebs-Loeffler bacillus of diphtheria, *Bacillus typhosus Diplococcus pneumoniæ* of Fränkel, *Bacillus proteus*, and *Bacillus aerogenes capsulatus*. These were found by Williams to be present in the following number of cases out of 40 cases of puerperal fever which he examined: streptococcus, 8 cases; staphylococcus, 3; *Bacillus coli*, 6; diphtheria bacillus, 1; typhoid bacillus, 1; *Bacillus aerogenes*, 1, anaerobic bacilli, 4; unidentified aerobic bacilli, 3; gonococcus, 2; bacteria present on slide but culture sterile, 4; whilst in 11 cases no organisms were present.

In that curious condition known as physometra, the *Bacillus coli communis* and the *Bacillus aerogenes capsulatus* have been found in the secretions. Altogether about thirty species of micro-organisms have been found in the genital passages. The following are the most notable:

Streptococcus pyogenes.
Staphylococcus pyogenes albus.
Staphylococcus pyogenes aureus.
Micrococcus tetragenus.
Gonococcus of Neisser.
Diplococcus flavus liq. tardus (of eczema).
Diplococcus albicans amplus.
Diplococcus pneumoniæ of Fränkel.
Proteus vulgaris.
Bacillus coli communis.
Bacillus pyocyaneus.
Bacillus tuberculosis.
Bacillus typhosus.
Bacillus of typhus.
Bacillus of diphtheria.
Bacillus of tetanus.
Bacillus of leprosy.
Bacillus aerogenes capsulatus.
Actinomyces.
Monilia candida.

In concluding these remarks on the secretions the following résumé of the different kinds of discharge found in the female genital passages may prove useful:

1. Normal vaginal discharge, of which the characters have

been given above—viz., white, creamy or curdy, and so slight in quantity as not to attract the patient's attention

2. A clear viscid discharge, composed principally of mucus. This is the normal cervical discharge, and is usually not seen except on examining with the speculum; but it may be mixed with the vaginal discharges at the beginning and end of menstruation, and occasionally, when abundant, at other times.

3. A muco-purulent or purulent discharge, yellowish or greenish according to the proportion of pus. This is seen characteristically in acute gonorrhœa, and commonly results also from chronic endometritis. It is the variety most frequently spoken of as " the whites," when containing but little pus. It stains and stiffens the linen.

4. Watery discharges may result from simple hyperæmia of the genital passages, and are sometimes so abundant as to lead to the suspicion that the fluid is furnished by a hydrosalpinx which periodically empties itself through the uterine orifice of the Fallopian tube. They are also found in cases of cancer, but then the discharge more often assumes the characters of the next variety.

5. Fœtid discharges occur as the result of ulceration, and the principal conditions which produce them are retained pessaries, sloughing fibro-myomata and polypi, decomposing products of conception, and, most frequently of all, cancer.

6. Bloody discharges, other than menstrual, may be due to cancer, endometritis, fibro-myomata, polypi, adenomatous disease of the cervix, and lacerations. The discharge is often pinkish in cancer, but in any of the above conditions it may vary from a very slight rose tint to the red of almost pure blood.

7. In the case of a tubal pregnancy which has become interrupted by rupture of the tube, or by the formation of a tubal

mole, a characteristic discharge is often present. It is scanty and of a brownish colour, and may continue for many weeks. It is due to disintegration of the decidua which forms in the uterus in cases of extra-uterine pregnancy.

A similar discharge may result from the slow disintegration of a polypus or clot within the cavity of the uterus.

CHAPTER XIV

DISEASES OF THE VAGINA—(*Continued*)

INFLAMMATION, TUMOURS AND CYSTS.

Vaginitis.—The chief causes of inflammation of the vagina are: (*a*) *Injuries*, such as result from obstetric operations, accident, foreign bodies, retained pessaries, immoderate coitus, and careless application of caustics to the uterus; (*b*) *infections*, such as gonorrhœa, sepsis, and tuberculosis.

According to the age of the patient different types will be found. In children it may be simple, or due to thread-worms, gonorrhœa, and exceptionally to uterine tuberculosis. In adults it is nearly always gonorrhœal. Want of cleanliness and constitutional conditions are predisposing causes, as they favour the growth of pathogenic organisms (see preceding chapter).

The hyperæmia of pregnancy predisposes to vaginitis, whether due to injury or to infection, and it may also cause a latent gonorrhœa (allied to gleet in the male) to take on increased activity. It is, however, probable that when gonorrhœa remains latent, it is located, not in the vagina, but in the cervix uteri. Beyond this predisposition, pregnancy does not give rise to any specific form of vaginitis, and it is not therefore necessary to describe it as a separate variety, as is sometimes done. The same may be said of senile vaginitis, which is simply a vaginitis occurring in later life from causes which are identical with those that are operative in younger women; but it is worthy of note that the discharge may be thin and sanious, leading one at first to suspect carcinoma of the cervix.

Vaginitis may occur also during the puerperium, as part of a puerperal infection, and it is then generally septic. The laceration or bruising of the vagina by the passage of a large head, or by instruments, favours inflammation; and, indeed, apart from infection, there is always some degree of traumatic inflammation in these cases.

Pathology.—As in inflammation elsewhere, the first condition is congestion, causing heat and redness of the mucous membrane. The discharge which is produced is known clinically as leucorrhœa, and consists at first of a watery fluid, with cast-off epithelial cells. If the latter are in great quantity the discharge is no longer clear, but white and turbid (hence the name). If pus forms, it imparts a yellow or green colour to the discharge, which is then conveniently described as xanthorrhœa.

In simple cases the inflammation soon subsides, without further change than more or less desquamation of the epithelium. In senile vaginitis atrophic changes follow: the epithelium is reduced in thickness, and fibrous changes ensue in the mucous membrane, which narrow the lumen of the passage. The same result may occur in places from the action of caustics, but here the epithelium may be deeply destroyed, and the contraction is sometimes marked (see Complications). When the vaginitis is purulent, from sepsis or gonorrhœa, on microscopic examination the epithelium is seen to be at first swollen, owing to infiltration of round cells in the papillæ, which are very vascular. The interpapillary spaces are filled up by exudation of cells and serum till the papillæ cease to be distinct. The epithelium then becomes thin and presents the appearance of granulations, which bleed readily (Ruge). The gonococcus itself is not able to penetrate the stratified vaginal epithelium (Bumm), but the staphylococcus and streptococcus appear to be able to do so.

When vaginitis is due to a retained pessary, the granulations often become so exuberant as to surround and imbed the pessary (see Retained Pessary).

Under proper treatment, the granulations subside, and the epithelium gradually resumes its normal appearance. But when the inflammation has been very virulent, large patches of epithelium may be detached, mixed with coagulated exudation; and this condition has been described as diphtheritic, membranous, or desquamative vaginitis.

Varieties.—Clinically it is useful to distinguish the following varieties of vaginitis:

(*a*) Simple vaginitis.
(*b*) Vulvo-vaginitis of children.
(*c*) Gonorrhœal vaginitis of adults.
(*d*) Membranous vaginitis.

(*a*) *Simple Vaginitis.*—This is nearly always due to injuries or to violence including immoderate sexual intercourse. The symptoms are heat and throbbing in the vagina, leucorrhœa, dyspareunia, and sometimes swelling of the external genitals, when it is complicated by vulvitis. If neglected, sepsis may become superadded, and the symptoms will then resemble those of gonorrhœal vaginitis, the most conspicuous feature being a purulent or muco-purulent discharge.

A simple vaginitis subsides rapidly under proper treatment. All that is required is to keep the patient in bed for a day or two, and to order vaginal douches of warm unirritating lotions, such as boracic acid or subacetate of lead. Sexual intercourse should, of course, be forbidden.

(*b*) *Vulvo-vaginitis of children* acquires some of its importance from its medico-legal bearings. The question of criminal assault sometimes arises, and the medical attendant should bear in mind the following points: First, vulvo-vaginitis of simple character may occur when there has been no violence or external interference of any kind. It is then found mostly in weak and neglected children, as the result of dirt, or possibly of tuberculosis. Secondly, vulvo-vaginitis may be produced by indecent violence short of rape. Thirdly, gonorrhœal vulvo-vaginitis may occur, in epidemic form, in schools; the starting-point may be an accidental contamination by the bed-clothes when children sleep with parents or elder brothers; and infection may be spread with towels or other linen, or by the use of one bath for several children. Fourthly, the gonorrhœa may result from rape; this is rare in proportion to the total number of cases.

In fifty-four cases of vulvo-vaginitis in children, Drummond Robinson found diplococci with the characters and staining reaction of the gonococcus in forty-one.

The symptoms are sometimes slight; with the exception of a mucous or purulent discharge they may be absent. But more often the child complains of pain, scalding micturition, or itching, and there may be some febrile disturbance. It has been shown that thread-worms may set up vaginitis in children by passing into the vagina from the rectum. The smallness of the hymeneal orifice in children, while it is in some measure a safeguard against infection, tends to aggravate the disease when once established, and is a difficulty in the way of cure, because it favours the retention of discharges.

(c) *Gonorrhœal vaginitis* is the most common form of vaginitis in adults. According to recent researches primary gonorrhœal infection is rare; the urethra becomes first affected, together with the endometrium; the vaginitis is secondary to the urethritis and endometritis. The character of the vaginal epithelium previously referred to is said to account for this order of events. Other authorities, however, believe that a primary vaginal infection always occurs, but that it is transitory.

Symptoms.—The patient complains of pain and burning in the vulva; smarting pain on passing water; dyspareunia and discharge. On examination, the vaginal walls are hot, red, and swollen, and acutely tender to the touch. The discharge, generally yellow or green, is found bathing the external genitals, as well as the vagina. In aggravated cases we may meet with some of the complications mentioned below.

Diagnosis.—There is no difficulty in recognising vaginitis, but the diagnosis of its nature is often as difficult as it is important. The question is whether, in a given case, the condition is gonorrhœal or not. On the answer much often depends, such as questions of criminal assault and of unchastity. If the gonococcus be found in the pus, the existence of gonorrhœa is established; its absence, however, is no proof to the contrary. If the inflammation be non-purulent, if the urethra be unaffected, and if the Bartholinian ducts be not involved, the probability is strong that the case is not gonorrhœal; in the opposite conditions the probability is in favour of gonorrhœa. Some information may be derived from the existence of urethritis in the husband; if he have a marked purulent urethritis and the pus contains gonococci, the argument is in favour of gonorrhœa in the woman. When there is pus, it may be septic in origin, or it may come from the cervix uteri in cases of endometritis and carcinoma of the cervix, and not primarily from the vagina. A careful examination must therefore be made with the speculum, when, if the vagina be at fault, it will be seen to be reddened and injected, and studded over with brighter red points.

Course and Complications.—If left untreated, a simple vaginitis does not give much trouble; but the results of gonorrhœa are far-reaching and serious. The most important is the spreading of the disease up the genital passages, producing successively endometritis, purulent salpingitis, and septic peritonitis. For this reason gonorrhœa is a much more serious condition in women than in men. Nor does the danger stop here. Under the influence of pregnancy a latent gonorrhœa may reawaken to virulent activity, in the vagina, the uterus, or the tubes; or the trouble may lie dormant till labour comes on, when a rapidly fatal form of puerperal septicæmia may develop, for which the medical attendant may incur undeserved responsibility. In other and perhaps more frequent cases sterility results from the sealing up of the fimbriated ends of the Fallopian tubes, which become converted into bags of pus. This is generally associated with a troublesome form of dysmenorrhœa. It is evident, therefore, that no effort should be spared to treat energetically and thoroughly every case of acute gonorrhœal vaginitis.

The infection of the urethra seldom causes any complications in women; stricture is very rare, and consequently the bladder, ureters, and kidneys commonly escape. At times, however, cystitis may be set up.

Infection of the glands of Bartholin's duct leads to an abscess in this situation. Sometimes one side only is affected, but more often both sides are involved, either together or consecutively. The labia may suffer considerably with inflammation, œdema, or gangrene; but these complications are found more often when gonorrhœa is part of a mixed infection.

A very common complication of neglected gonorrhœa is a breaking out of condylomata over the vulva and adjacent parts of the thighs and round the anus. Want of cleanliness is here an important contributory cause. In the case both of simple gonorrhœa and of mixed infection the inguinal glands may suppurate and form a bubo.

In addition to these complications, the following have to be considered:

Vesico-vaginal and Recto-vaginal Fistulæ.—These occur more often from other causes, but may result also from severe vaginitis attended with ulceration and sloughing.

Stenosis Vaginæ.—This is especially apt to occur when there has been extensive destruction of the epithelium, and is therefore often well marked when the vagina has been much injured by caustic applied to the cervix uteri. In such cases, if examined at a later date, the finger discovers the vagina to be contracted, usually a little below the level of the external os. The contraction may be so great as barely to admit the finger-tip. But if this can be passed through the constriction, which is often annular, it enters an expanded part of the vagina, in which is found the cervix. The vagina may, in fact, be said to present an hour-glass contraction. The condition, if it occur in later middle age, about the time of the menopause, causes but little trouble; but in earlier adult life the contraction may go on to obliteration of the canal, and hæmatocolpos results. Similarly, but more rarely, the external os may become stenosed or occluded, giving rise at first to dysmenorrhœa, and later to hæmatometra.

Purulent ophthalmia is a frequent complication of vulvo-vaginitis in children, the infection being conveyed directly by the patient's fingers or indirectly through linen and clothing.

Peritonitis ranks next in order of frequency to ophthalmia as a complication of gonorrhœa in young women.

Gonorrhœal rheumatism also occurs, but less frequently than among men.

Prognosis.—From the above it will be seen that when treatment is not thoroughly carried out, the prognosis is grave as regards the subsequent health. With proper care, however, in the early stages, the outlook is very satisfactory.

Treatment.—Energetic treatment must be undertaken in order to abort the course of the disease, and diminish the tendency to complications. The following will be found an effective method: The patient is anæsthetized and placed in the lithotomy position; the vagina is then well irrigated with a solution of carbolic acid (1 in 40), after which it is thoroughly swabbed out with a solution of carbolic acid in glycerin (1 in 10), or with a solution of chloride of zinc (10 grains to ℥j.). The cervix is similarly treated, and a uterine probe may be dipped into the solution and applied to the uterine cavity. The vagina is then again irrigated with carbolic lotion (1 in 40) or a saturated solution of boracic acid; iodoform tampons are placed in the vagina, and the patient sent back to bed. The after-treatment consists of douches, morning and evening, with warm saturated boracic lotion.

If this thorough treatment under an anæsthetic cannot be applied, douches of carbolic acid (1 in 40) or perchloride of mercury (1 in 2,000) should be ordered morning and evening. It is not advisable that much force should be used, lest toxic discharges be forced up into the cervical canal.

A milder method, often serviceable when there is much pain and tenderness, is a course of hot sitz-baths, twice daily. In children it is advised that, in the acute stage, care should be taken that the child's head be not immersed in the bath, lest the eyes become contaminated by the discharges. After bathing or syringing, iodoform bougies may be placed in the vagina, each vaginal bougie containing 3 grains of iodoform. For children smaller bougies are employed. Chronic vaginitis is not seen except in association with chronic endometritis, and its treatment is described with that of the latter condition.

The treatment of complications must be carried out as may be required.

An abscess in the vaginal wall may be due to extension of pelvic cellulitis into the connective tissue of the vagina, and the abscess-cavity may remain connected with that from which it is derived or become cut off from it; or it may be due to suppuration in a vaginal cyst. The condition closely resembles that of a lateral pyocolpos, and an incision may be necessary before its nature is discovered. The febrile symptoms and the redness of the vaginal wall over the swelling will indicate the presence of pus. The treatment consists in evacuating the pus by means of a free incision.

(*d*) *Membranous Vaginitis.*—Several conditions are included under this description, because membranous vaginitis may be due to traumatism, such as the introduction into the vagina, by accident or design, of strong caustics or corrosives; to acute septic infection, when the causal organism is generally the staphylococcus; or to diphtheria, when the Klebs-Loeffler bacillus will be found. In the latter case the "membrane" is chiefly composed of fibrin; in the other cases it consists of necrotic material in which the outlines of cells can be made out, but containing little or no fibrin. It is possible that vaginal tuberculosis may present a similar appearance.

The best *treatment* is to thoroughly disinfect the vagina with antiseptics, under an anæsthetic. In subacute cases this may be preceded by a light curettage, and the vagina should then be packed with iodoform gauze, the packing being repeated every few days. Special care in after-treatment is required to prevent cicatricial contraction and stenosis of the vagina, as this is very apt to result.

TUMOURS AND CYSTS OF THE VAGINA.

The vagina is rarely the seat of tumours; they belong to four genera: lipomata, myomata, sarcomata, and carcinoma. Lipomata and myomata are very rare.

Sarcomata.—Examples of this genus occur in adults; it appears that they are rare before forty years of age. They are sessile, ulcerate early, and bleeding is the first sign which attracts attention (Gow). In children they have a tendency to be polypoid. They cause death by interfering with the bladder or rectum (D'Arcy Power).

Carcinoma.—This disease may arise in any part of the vaginal mucous membrane, but it is more liable to begin at the junction of the vulva and vagina, or on that portion which is reflected over the cervix uteri. When carcinoma attacks the vulvar end of the vagina, it is very apt to begin near the urethral orifice. In such cases the inguinal lymph-glands are early infected; the ulceration quickly involves and perforates the vesico-vaginal septum, and leads to a fistula. When the posterior wall is attacked, ulceration leads to a recto-vaginal fistula.

It is a very extraordinary thing that the early stages of this fatal disease cause so very little inconvenience that patients rarely seek advice until the disease has long passed the limits of justifiable surgery.

Cysts.—The vagina is liable to the following species: mucous, Gartnerian, and peri-urethral cysts, and echinococcus colonies.

Mucous Cysts.—These are small and resemble retention cysts, but their nature is doubtful. Some observers consider them as retention cysts of vaginal glands; others deny the existence of such glands, and explain these cysts as due to obliteration of the mouths of crypts in the vaginal wall. By others, again, they are regarded as due to dilatation of lymphatic spaces, and are described as associated with gaseous bullæ in the condition called emphysematous vaginitis.

They occur not infrequently in cases of vaginitis and endometritis, resembling superficially the Nabothian follicles seen on the cervix.

Gartnerian Cysts.—The pathology of these cysts is described in connection with the parovarium (p. 342).

Cysts arising in the terminal segment of this duct project as soft fluctuating swellings in the upper part of the vagina; sometimes two distinct cysts arise in connection with one duct. They vary greatly in size; some do not measure more than 2 centimetres in diameter, others may exceed these dimensions three or four times. The inner wall of the cysts is lined either with cubical or stratified epithelium.

Peri-urethral Cysts.—Small cysts are sometimes found in the anterior vaginal wall near the urethra; sometimes they bulge into the urethra. Skene is of opinion that these cysts arise in the ducts, which he detected and described, in the floor of the urethra near the meatus.

Echinococcus Colonies (*Hydatids*).—These are very rare, and are generally due to echinococcus colonies in the mesometrium burrowing in the recto-vaginal septum.

Treatment.—This is the same as that employed for tumours and cysts in other regions of the body—namely, removal—but in the case of sarcomata and carcinoma it is rare for the disease to come under observation before it has so deeply involved the rectal and vesical walls that interference with it only anticipates the complications which ensue in the natural course of the disease—rectal and vesical fistulæ. Cysts, when small, are readily enucleated, and the proceeding is safe if the operator keeps close to the cyst-wall. In the case of large Gartnerian cysts which burrow from the vagina into the mesometrium, unless great care is exercised the ureter may be easily damaged, and a troublesome fistula result. When there is difficulty or anxiety in enucleating vaginal cysts, the surgeon may freely incise them, evacuate the contents, and stuff the cavity with gauze; the cyst is then slowly obliterated by granulation. This method, however, though safe, is rarely certain, for the rent in the wall may close and the cyst reform. Enucleation of the whole of the cyst-wall is the only sure method of treatment.

CHAPTER XV

DISEASES OF THE UTERUS

AGE-CHANGES, FLEXIONS, AND DISPLACEMENTS.

Age-changes.—The uterus undergoes some important changes between birth and puberty. In the new-born infant the uterus has no fundus, its summit is often deeply notched, and the neck of the uterus is larger than its body. The arbor vitæ is very distinct. The body of the uterus lies above the level of the brim of the true pelvis, and its anterior surface forms a well-marked curve where it rests on the urinary bladder. Towards puberty the fundus develops, and the organ assumes the pear-like shape so characteristic of the mature uterus. After the menopause, it shares in the general atrophy of the reproductive organs. The cervix especially diminishes in size until it becomes merely a small button-like projection at the inner end of the vagina.

Measurements.—The fully-developed virgin uterus has the following average dimensions: length, 3 inches (7·5 centimetres); breadth, 2 inches (5 centimetres); thickness, 1 inch (2·5 centimetres); length of cavity, 2½ inches (6·2 centimetres); weight, 1½ ounces (42 grammes). After pregnancy the uterus never regains its virgin proportions, but remains, until the menopause, enlarged in all its measurements and increased in weight.

FLEXIONS AND DISPLACEMENTS OF THE UTERUS.

It has been customary to include anteversion among the displacements of the uterus; as this is the normal position of the uterus, and never gives rise to symptoms, it will be omitted from the list of pathological conditions.

We have, then, to consider the following: Anteflexion, retroflexion, retroversion, prolapse and procidentia.

Anteflexion of the Uterus.—This, when moderate, is normal; it becomes abnormal when exaggerated.

Causes.—It is most often congenital. It has been stated that it may be due to parametritis involving the utero-sacral ligaments, and that the subsequent cicatricial contraction may draw the portion of the uterus to which these ligaments are attached backward, causing anteflexion. This explanation is theoretical, and the occurrence, if it takes place at all, is extremely rare.

Symptoms.—Even a considerable degree of anteflexion may exist without causing any trouble, especially in the young. When symptoms are present they are: (1) dysmenorrhœa; (2) sterility; (3) reflex nervous phenomena. The way in which dysmenorrhœa is produced is not quite plain. It has been attributed to obstruction to the outflow of blood by the projecting angle, but this is improbable, for in the first place the menstrual flow in these cases is always moderate, and even scanty, and the amount of blood passing at any one time is therefore small; and in the second place obstruction would necessarily cause accumulation behind the obstruction, and this never occurs. More probably the pain is caused by the contraction of the muscle fibres at a disadvantage, and by compression of a hypersensitive mucosa by the muscular contractions. The dysmenorrhœa generally comes on some years after the first establishment of menstruation, but in neurotic patients it may be present from the first.

Sterility is due partly to the fact that congenital anteflexion is generally associated with under-development of the uterus, and a pinhole os; but it may also result from the tilting forward of the cervix, for when the canal is straightened, and the cervix is made to point backward, conception sometimes follows.

Reflex nervous phenomena are not uncommon; one of the most frequent is bladder disturbance.

On examination the fundus is felt like a knob just in front of the cervix, and between the two the tip of the finger rests in a well-defined angle. The sound is arrested at the internal os, and in order that it may pass to the fundus it may require to be sharply bent forward, for the canal of the cervix often makes a right angle with that of the body of the uterus. Two varieties of anteflexion are found: in one, the cervix is in its normal position, whilst the fundus is bent forward and downward (Fig. 32, III.); in the other, the fundus is in normal position, while the cervix is bent forward and upward (Fig. 32, II.).

Treatment.—Vaginal pessaries are absolutely useless. Two courses are open: first, dilatation of the cervical canal; secondly, a plastic operation. The dilatation should be carried up to 12 millimetres. It has the effect of straightening the canal. It may be necessary to repeat the dilatation after a few months, or to pass a few smaller dilators from time to time. In virgins these repeated manipulations are a disadvantage. Plastic operations include the division of the cervix by a single median incision or bilaterally.

Retroflexion of the Uterus.—This occurs, rarely, as a congenital condition; more often it is acquired, and occurs as a complication of retroversion (Fig. 32, V.). In the former condition, if the fundus of the uterus be brought forward—

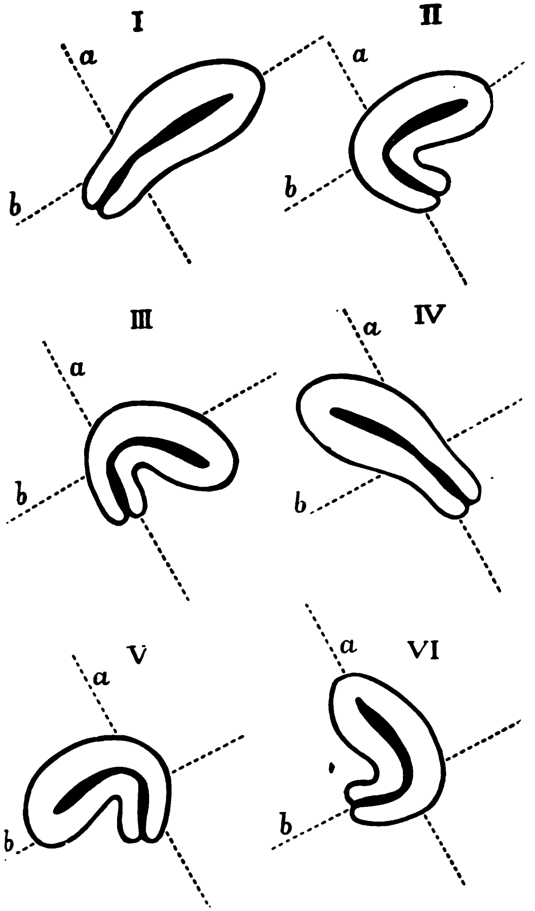


FIG. 32.—DIAGRAMS ILLUSTRATING FLEXIONS AND DISPLACEMENTS OF THE UTERUS: *a*, AXIS OF THE VAGINA; *b*, AXIS OF THE NORMAL UTERUS; I., NORMAL POSITION; II., ANTEFLEXION, FUNDUS IN NORMAL POSITION; III., ANTEFLEXION, CERVIX IN NORMAL POSITION; IV., RETROVERSION; V., RETROVERSION WITH RETROFLEXION; VI., ANTEVERSION WITH RETROFLEXION.

for instance, by the sound—it springs back into the faulty position as soon as the sound is withdrawn. But when it is acquired, there is at first free hinge-like movement at the internal os, and the fundus, if replaced, remains in the new position. If it remain long retroflexed this mobility becomes impaired. The uterus sometimes becomes fixed in a position of retroflexion by pelvic cellulitis.

Symptoms.—(1) Dysmenorrhœa, produced in a manner analogous to that resulting from anteflexion; (2) pain on defæcation and constipation, due to the pressure of the fundus on the rectum; (3) the patient is often, but not invariably, sterile.

On the other hand, retroflexion may be present without causing any symptoms, and it then requires no treatment.

Treatment.—If the uterus be freely movable, as indicated above, the flexion should be first corrected by digital manipulation, or failing this by the sound, and a Hodge pessary introduced. Special care must be taken lest the uterus be brought into a position of anteversion while the flexion remains unreduced (Fig. 32, VI.). The position of the cervix must accordingly not be taken as a guide, but the fundus must be felt bimanually in front of the cervix.

If the uterus be rigid, a Hodge pessary will not correct the flexion; dilatation of the cervix is then the proper treatment, and a Hodge pessary may be subsequently applied, or a plastic operation may be undertaken. Failing these measures, hysteropexy will be required.

Retroversion of the Uterus.—Retroversion of a normal-sized uterus is, under certain circumstances, physiological—for instance, in a patient lying on her back with a full bladder. In such a case it is not an uncommon thing to find, on making a second examination a few days later, that the fundus is lying forward. The same thing may occur with a uterus that is slightly enlarged, as in early pregnancy, and during the early weeks after labour. These conditions, therefore, require no treatment. In other cases retroversion is a pathological condition.

Causes.—(1) Relaxation of the uterine ligaments, as the result of repeated pregnancy. The utero-sacral, round, and broad ligaments are all involved, for if any one pair of the three retained its normal tension, retroversion would be resisted.

2. Increased weight of the fundus, due to chronic congestion, subinvolution, pregnancy, or myomata.

3. Cicatricial contraction following pelvic inflammation.

4. Pressure on the front of the uterus, due to an ovarian or other tumour, or to a frequently overdistended bladder. A wandering spleen lodged in the pelvis has been known to cause the same result.

5. Retroversion is in rare cases due to a fall or sudden strain. It is a question whether this cause can operate without the predisposition indicated under paragraphs 1 and 2.

Symptoms.—These vary according as the retroversion is simple or complicated by pelvic inflammation or fixation. Among the symptoms caused by a movable retroverted uterus, there may be sudden pain, if the displacement has been accidentally produced; otherwise the patient complains of a feeling of ill-defined weight and fulness in the pelvis, due, probably, to congestion. From the position of the fundus there is often discomfort during action of the bowels, and constipation. Bladder disturbance is not common unless the uterus is enlarged, and then there may be enough pressure of the tilted cervix against the base of the bladder to cause frequent desire for micturition with dysuria, followed by complete retention of urine. If the fundus remains for some time low in the recto-vaginal (Douglas's) pouch, the tubes and ovaries are dragged upon, and one or both of the latter may become "prolapsed." In that case dyspareunia is generally complained of, as well as dysmenorrhœa, and sterility is usually present.

When complicated with pelvic inflammation, the chief symptoms are: pain, often excessive and continuous; severe dysmenorrhœa; irregular metrorrhagia, due to the fact that the uterus cannot contract properly; abundant leucorrhœa, caused by the pelvic congestion; general weakness, and secondary nervous disturbances.

The reflex nervous disorders consequent on retroversion and retroflexion (for the two conditions are freqeuntly combined) require some notice. A list of them would comprise all known functional disorders, and, while the association of some of these with displacement may be considered as a coincidence, there are many which must be regarded as directly due to the uterine condition, as is shown by those cases in which reposition of the uterus is followed by immediate cessation of symptoms, whilst these come on again at once if the displacement recurs. The most frequent reflex neuroses are: digestive disorders, especially vomiting; cardiac disturbances; frequency of micturition and incontinence of urine; headache and neuralgia. In some cases of long standing, the restoration of the uterus to its proper position is not followed by improvement of the reflex disorders, although the first appearance of these may have coincided with the commencement of the uterine trouble.

Complications.—Among these we might reckon the nervous disturbances just referred to. The local complications include pelvic inflammation, prolapse of the ovaries and tubes, and hernia of the pelvic floor—namely, cystocele, rectocele, and prolapse of the uterus. As we shall point out in discussing prolapse, retroversion of the uterus is nearly always the first stage in the production of that condition.

Treatment.—The first thing is to replace the uterus.

with the fingers alone if possible; with the sound if necessary.

Digital Manipulation.—Two fingers are introduced into the vagina and are made to press on the fundus, through the posterior vaginal fornix, in a direction forward and upward. If the uterus be fairly rigid the fundus can readily be tilted up by pressing backward on the front of the cervix. The fundus being raised by either method, the fingers of the other hand depress the abdominal wall above the uterus and bring the fundus forward, whilst the fingers in the vagina assist by pressing the cervix back. The manipulation may be assisted by placing the patient in the genupectoral position, and in difficult cases, when the use of the sound is contra-indicated, this should be done.

Replacement with the Sound.—The sound is passed with the concavity of the curve pointing backward. When the point is at the fundus, the handle is brought round to the front with a wide sweep, so that its intra-uterine portion rotates on its longitudinal axis, but does not otherwise move. On no account should the semicircle described by the revolving portion be made by the point of the sound. The handle is then gently and slowly drawn backward, in the middle line, toward the perineum, until the fundus can be felt with the hand on the abdomen. While the sound is being withdrawn, the finger in the vagina should be pressed against the cervix, to keep it in position.

The uterus having been replaced, some form of Hodge pessary is introduced, paying attention to several points. Thus the instrument must fit properly; it must be adapted to the width of the posterior fornix, and also to the length of the vagina. If too long, it is apt to press on the urethra, and cause difficulty in micturition; or it may press on the rectum, and produce a tendency to constipation. If the vaginal walls are lax and the fundus heavy, the instrument is likely to be tilted up anteriorly, and the retroversion is reproduced. If an ovary is lying in the recto-vaginal (Douglas's) pouch it may be pressed upon, and much pain will result. An instrument made of block-tin answers well; it is clean, and can be moulded to any desired shape. One or both of the posterior angles can be depressed to prevent pressure on the ovaries, and the anterior bar may be indented so as to form an arch over the urethra. The relation of the breadth to the length of the instrument can also be adjusted. As a rule the posterior bar should be made to project well forward and upward.

When adhesions are present, treatment must be different. Obviously, to put in a pessary is to add risk to inefficiency. The one thing needful is to restore the mobility of the uterus. If time be no object, this may sometimes be attained by a somewhat prolonged course of rest in bed, combined with a depletory treatment by means of vaginal irrigation and tampons of glycerin, with or without ichthyol (5 to 10 per cent.). During this treatment an occasional attempt must be made to raise up the uterus; for this purpose the sound may be used, but it requires to be employed with great care. After some time it will often be found that the uterus can be moved a little, and by degrees the normal position can be restored. When this occurs a Hodge pessary is introduced and kept in for some time.

If suppurative disease of the appendages be present, the above treatment will generally be futile, and until the organs offending be removed no permanent cure can be hoped for.

Sometimes the adhesions, by long neglect, have become so firm that they cannot be overcome by the above means. An operation then gives the only hope of cure—namely, opening the abdomen, freeing the adhesions, and suturing the fundus to the abdominal wall (hysteropexy). This should not be lightly undertaken, but the risk attending it should be carefully weighed with the alternative of not operating, which may mean a life of chronic invalidism and impaired usefulness.

Even when there are no adhesions, pessaries may, after long trial, entirely fail to relieve the retroversion and the attendant symptoms, and here also operative interference may be required. Hysteropexy and the operation for shortening the round ligaments are the two principal methods of dealing with this condition, but we strongly prefer hysteropexy as it is the more satisfactory operation and gives excellent results.

CHAPTER XVI

DISEASES OF THE UTERUS—(*Continued*)

PROLAPSE AND PROCIDENTIA; HYPERPLASIA AND ATROPHY OF THE UTERUS.

THE terms **prolapse** and **procidentia** are applied to different degrees of the same condition: when the uterus, though low down, lies entirely in the vagina, it is spoken of as prolapse; when it protrudes through the vulva, as procidentia.

Causes.—All the causes of retroversion of the uterus, except cicatricial contraction due to pelvic inflammation, may be regarded as predisposing to prolapse, inasmuch as the former is the first stage of the latter. The exciting causes are:

1. Increased intra-abdominal pressure, either continuous, as in the case of ascites and abdominal tumours, or intermittent, as from frequent straining efforts or a chronic cough.

2. Weakening of the supporting structures of the pelvic floor, such as relaxation and thinning of the vaginal walls and laceration of the perineum. A very patulous condition of the vulva, such as is met with sometimes in multiparæ, may have the same effect as a damaged perineum.

3. Traction on the uterus from below, by the weight of an enlarged cervix, by a cervical tumour, or by repeated operative manipulations, whereby the uterus is drawn down.

Pathology.—It occasionally happens, when the pelvis is large and the vaginal walls are very lax, that the uterus becomes prolapsed in a position of anteversion; but this is rare. The uterine canal is normally at right angles to the vagina, and in the great majority of cases the uterus must come to lie in the axis of the pelvic outlet before prolapse can occur to any extent. As long as it lies in the axis of the pelvic inlet, deficiency of the pelvic floor has no appreciable effect, and intra-abdominal pressure simply presses the whole uterus backward against the posterior vaginal wall and the sacrum. But, once retroversion takes place, the lack of perineal support is felt, and increased pressure leads to descent of the uterus toward the vaginal orifice. The mechanism presents a close parallel to the delivery of the head during parturition in the unreduced occipito-posterior position: the long axis of the head does not conform to that of the pelvic outlet, and delivery is delayed; whilst as soon as rotation forward of the occiput places the long axis of the head in relation to that of the pelvic outlet, descent is easy.

As the uterus descends, it draws down with it the upper part of the vaginal walls, whereby the vaginal fornices are deepened. If the initial causes remain at work, and the vaginal orifice be large, either from stretching or from deficiency of the perineum, the cervix protrudes from the vulva (Fig. 33), and eventually the greater portion or the whole of the uterus comes to lie outside, covered by the vaginal walls reflected over it. In this way a mass the size of the closed fist may be found outside the vulva.

When the whole vaginal attachment is very lax, the lower portion of the vaginal walls may take part in the protrusion, in the form of a cystocele and rectocele; whilst in exceptional cases the tubes and ovaries, the bladder, and a considerable portion of the intestines may come to lie in the hernial mass.

There is another mode of production of prolapse in which descent of the whole uterus is not the principal feature; but the first stage is elongation of the supravaginal portion of the cervix—*i.e.*, the part situated between the internal os and the vaginal portion. In the course of the hyperplastic elongation, either the fundus must be pushed upward or the vaginal portion downward. The latter is the course of least resistance, and is consequently followed. In these cases the cervix may be low down, while the fundus is nearly in its normal position, and the uterine cavity is found to be greatly lengthened (Fig. 34). Later, the whole uterus may assume a lower position as the result of the increasing weight of the cervix. Authors differ in the relative influence which they ascribe to these two conditions, primary descent and hyperplasia, in the production of prolapse; the difference is no

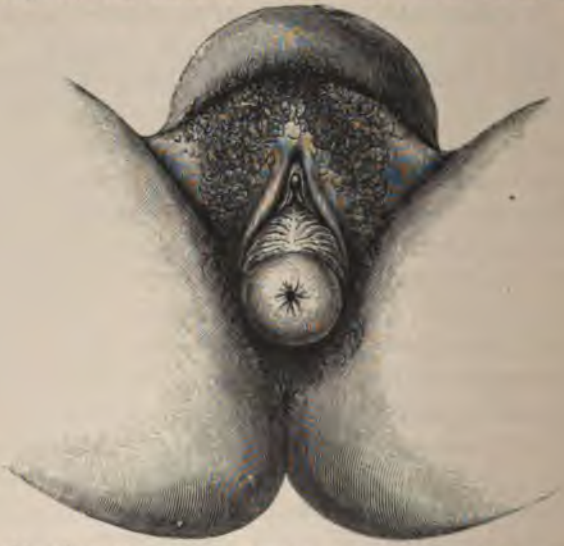


FIG. 33.—PROLAPSE OF UTERUS DUE TO THE PRESSURE OF TWO OVARIAN DERMOIDS.

doubt partly due to the fact that in cases of primary descent a certain degree of secondary hyperplasia generally occurs. We believe that primary descent is the more frequent condition.

According to some authorities, two clinical types of prolapse are found. In the utero-vaginal, the descent of the uterus is the principal factor, and as it descends it everts the anterior and posterior walls of the vagina almost equally. In the vagino-uterine type, the vaginal wall (usually the anterior, but sometimes the posterior) leads the way. This may be the result of subinvolution of the vagina after labour. As the vagina descends, it draws down the cervix, and the uterus with it. But if the utero-sacral ligaments are strong enough to resist the drawing down of the body of the uterus, the cervix becomes stretched out and lengthened (Gow). The result of this second type is the same as we have just described as resulting from a primary hyperplasia of the cervix, and we believe that the explanation we have given is the more probable, as it appears doubtful whether descent of the vaginal wall could make sufficient traction to cause elongation or hyperplasia of the cervix.

Results of Prolapse and Procidentia.—The continued retroversion leads to chronic congestion and hyperplasia of the whole uterus; but the effect is most marked in the cervix, which is less supported by surrounding structures and more exposed to the influences leading to chronic inflammation. We find, therefore, chronic cervical catarrh and cervical hyperplasia in the majority of cases, whilst adenomatous disease is frequent.

In cases of procidentia the cervix is greatly enlarged. By the rubbing of the clothes and exposure to the air the exposed surface of the vagina and cervix is hardened and thickened, so that it comes to resemble skin, and patches of ulceration are not uncommon. These may attain the size of a florin; they have a clean, punched-out appearance; the base and margins are smooth, and the latter are neither raised nor undermined. When the protrusion has been reduced and kept in position for some time, the hardened surface becomes moist and soft again, returning to its normal condition, and the ulcers rapidly heal.

Signs and Symptoms.—The patient complains of a feeling of "bearing down"; of trouble with micturition and defæcation; of pain and fatigue in walking; and of "falling of the womb." When the uterus is low down, but still confined within the vagina, the symptoms are often more severe than in procidentia; indeed, it is not uncommon to meet with patients who have been going about their work for a considerable time with a large mass protruding from the vulva. The signs are generally obvious. In the milder cases the cervix is felt to be low down in the vagina—the uterus being in a position of retroversion. The sound shows that the uterine cavity is lengthened, and the amount of lengthening will afford information as to the degree of hyperplasia in the case. A rectal examination will complete the information, for when there is not much enlargement the level of the fundus will be easily reached by the finger, whilst in cases of considerable elongation the fundus may in this manner be felt to occupy nearly its normal position.

Procidentia is evident on inspection. The external os will be found usually on the most prominent part of the mass, and occasionally in front of or behind this point when the case is complicated by a large rectocele or cystocele.

Diagnosis.—This is easy; but procidentia may be simulated by inversion of the uterus. In the latter condition the surface is redder and softer, and instead of the central orifice of the external os the two lateral orifices of the Fallopian tubes are seen. A large polypus may at first sight be mistaken for procidentia, but the absence of an orifice and the presence of a pedicle leading up to the cervix will establish the diagnosis. It is important to determine whether the case is one of simple descent or of hyperplasia of the supravaginal cervix, as the treatment is different. This may be done as above mentioned under the head of physical signs. It should be ascertained also whether there is any cause for the prolapse beyond deficiency of the pelvic floor and relaxation of ligaments, so that, if found, this may be dealt with.

Treatment.—A prolapsed uterus must first be placed in proper position, or a procidentia reduced. In many cases the introduction of a rubber ring pessary will then suffice to prevent recurrence. But it will often be found necessary to repair a torn perineum, removing at the same time redundant portions of the vaginal walls, before the ring will remain in the vagina. When such an operation is contraindicated, and the vaginal orifice is so wide that a ring cannot be kept in, some form of pessary with a vaginal stem and perineal bands will be required (see Chapter XVII.).

In cases of procidentia where the exposed surface is much ulcerated, the patient should be kept in bed, emollient applications made to the ulcers, and vaginal douches given. When the ulcers have healed, a pessary may be introduced. The congestion usually requires no special treatment, as it subsides when the uterus is maintained in a normal position.

Procidentia due to supravaginal elongation of the cervix must be differently dealt with: here complete reduction is not possible, as even when the fundus is in normal position the cervix is low down. Amputation of a portion of the cervix must therefore form the first step in the treatment, and it may be required also when the hyperplasia is secondary to descent. Cases of prolapse and procidentia which resist milder measures require further operative procedures, such as ventro-fixation of the uterus or the shortening of the round ligaments. It is in cases of this kind that hysteropexy has often given satisfactory results.

Alexander's operation succeeds, not by pulling up the uterus, but by maintaining the fundus in a position of anteversion. The first stage in prolapse, retroversion, being thus prevented, the prolapse itself is prevented. If the shortening be not sufficient to cause anteversion, it is useless, for the fundus is then able to move freely along an arc of a circle whose radius is determined by the length of the round ligaments, and whose centre is at the symphysis. The arc corresponds closely to the pelvic axis.

Total extirpation of the uterus has been advised and practised for the treatment of procidentia. The operation is, under the circumstances, singularly easy, but the question of the justifiability of so radical a measure is an important one.

HYPERPLASIA OF THE CERVIX UTERI.

This presents two varieties according as the supravaginal or vaginal portion of the cervix is affected.

Hyperplasia of the Supravaginal Portion (Figs. 34 and 35, A).—This may occur as a primary or secondary condition.

When **primary** it may in some cases be inflammatory in its origin, and some authors have supposed it to be so in every case. But we think it doubtful whether metritis often has this effect, and prefer to regard the origin as unexplained. Specimens examined after removal have sometimes presented the appearances of metritis, but this may have occurred as a secondary change. In other cases the structure has been that of the normal cervix.

The effect of this hyperplasia has been described in the section on Prolapse of the Uterus. The fundus remains in its normal position, while the cervix is found low down in the vagina or protruding from the vulva.

When **secondary** it is the result of prolapse (Fig. 34), and is most likely to occur when the latter is caused by traction from below while the fundus is partly anchored by adhesions;

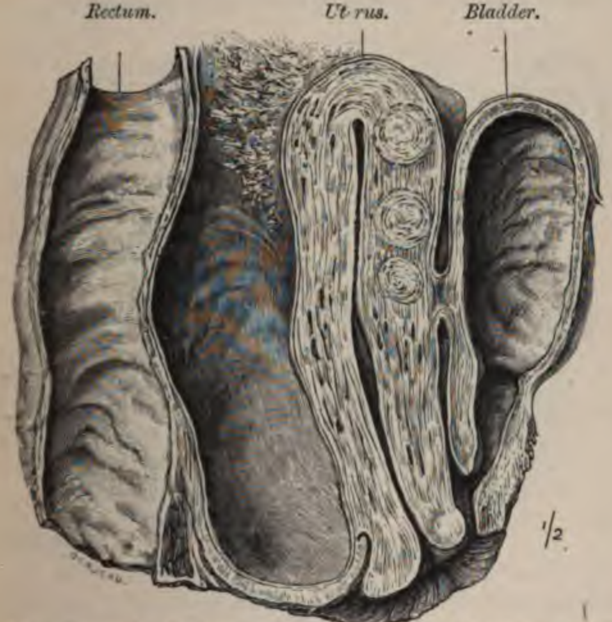


FIG. 34.—UTERUS, BLADDER AND RECTUM IN SAGITTAL SECTION; FROM A CASE OF HYPERPLASIA OF THE SUPRAVAGINAL PORTION (MUSEUM OF ROYAL COLLEGE OF SURGEONS).

but the congestion of a prolapsed uterus no doubt plays a part in the production of hyperplasia.

Whether the hyperplasia be primary or secondary, the resulting condition is the same. The cervical portion of the uterine canal is elongated. The vaginal portion of the cervix retains its proper length, or may be slightly elongated; but a false appearance of great lengthening is produced by the dragging down of the vaginal fornices by the cervix as it descends (Fig. 35, A). For the same reason the vagina is always shortened.

The symptoms and physical signs are those of prolapse. The proper treatment is amputation of the cervix.

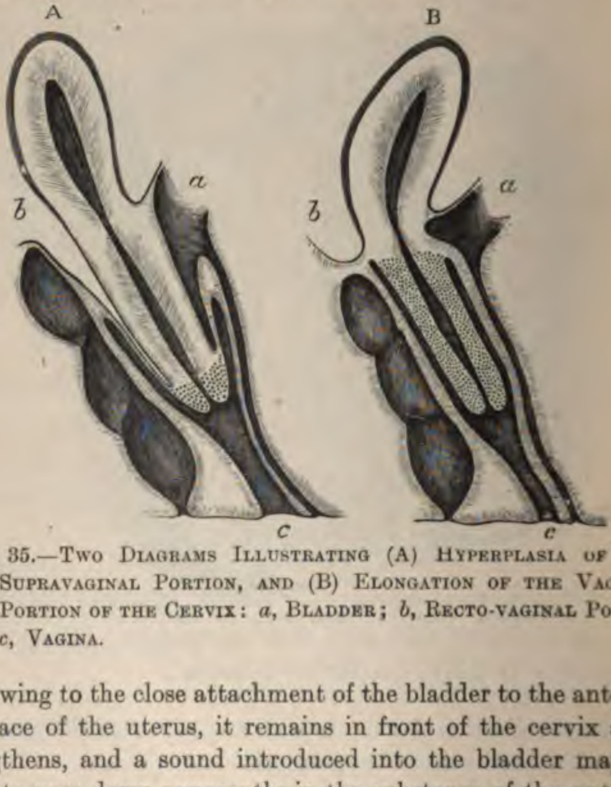


FIG. 35.—TWO DIAGRAMS ILLUSTRATING (A) HYPERPLASIA OF THE SUPRAVAGINAL PORTION, AND (B) ELONGATION OF THE VAGINAL PORTION OF THE CERVIX: *a*, BLADDER; *b*, RECTO-VAGINAL POUCH; *c*, VAGINA.

Owing to the close attachment of the bladder to the anterior surface of the uterus, it remains in front of the cervix as it lengthens, and a sound introduced into the bladder may be felt to pass down apparently in the substance of the anterior part of the cervix. Similarly, the peritoneum is closely connected with the posterior surface, and the recto-vaginal (Douglas's) fossa becomes deepened when the cervix lengthens.

so that a process of peritoneum may be found under the vaginal reflection on the posterior surface of the cervix. These facts require to be borne in mind in amputation of the cervix, lest the bladder be injured. The opening of the cœlom (peritoneal cavity) is less serious, and is perhaps in most cases unavoidable.

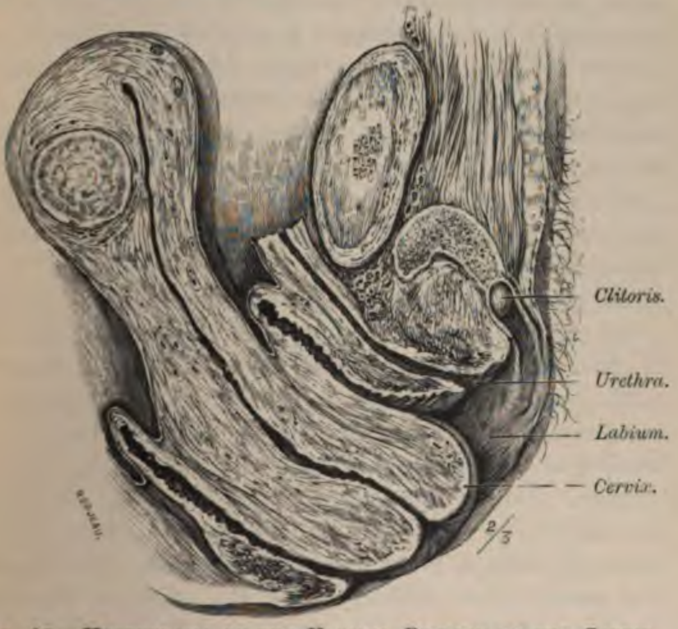


FIG. 36.—HYPERPLASIA OF THE VAGINAL PORTION OF THE CERVIX, ASSOCIATED WITH PROLAPSE.

Hyperplasia of the Vaginal Portion of the Cervix (Figs. 35, B, and 36).—This is often spoken of as the *infra-vaginal* portion; the above term is more correct. A small degree of hyperplasia often occurs, as previously stated, in connection with chronic cervical catarrh and erosion; the enlargement is then, more strictly speaking, due to inflammatory infiltration, with thickening of the glandular tissues, and we need not dwell on it further.

Simple elongation of the cervix is a developmental or congenital condition, but it is described here instead of in the chapter on malformations for convenience, and for the sake of comparison with the previous condition. The growth takes place principally at the time of puberty, and nothing is known as to its causation. It is generally associated with stenosis of the external os, which presents the "pinhole" type. The elongation may be so great that the cervix protrudes through the hymen. The vaginal reflection is attached to the base instead of near the apex of the hypertrophied portion, and consequently the length of the vagina is not diminished (Figs. 35, B, and 36). This serves as a striking distinguishing feature between this and the form of hyperplasia previously described. The bladder and recto-vaginal pouch retain their normal positions, and thus there is little risk of either being wounded during the operation of amputation.

The symptoms to which it gives rise are a sense of discomfort and the feeling of a foreign body in the vagina; sometimes it causes dysmenorrhœa, menorrhagia, and leucorrhœa. But in some cases, if the cervix remains within the vagina, no symptoms may be complained of till after marriage, when it gives rise to dyspareunia. The diagnosis is a matter of no difficulty when the length of the vagina has been ascertained. The only possible treatment is amputation of the cervix.

ATROPHY OF THE UTERUS.

Atrophy occurs normally after the menopause, and may proceed to such an extent that the cervix entirely disappears, leaving only a small aperture in the vaginal summit to represent the external os, while the fundus may shrink till it becomes a mere knob surmounting the vagina. The menopause may occur prematurely, but otherwise naturally, in women who have not borne children, and in whom consequently it cannot be ascribed to superinvolution; and in these cases a similarly marked atrophy may take place.

Atrophy may follow also an artificial menopause, due to the removal of the tubes and ovaries. Certain constitutional conditions produce the same result, especially tuberculosis and chlorosis, less frequently diabetes, Bright's disease, chronic morphinism, insanity, and other central nervous disorders. Lastly, it occurs in the form of superinvolution after delivery.

CHAPTER XVII

PESSARIES

A PESSARY is an instrument used to support the pelvic organs in cases of hernia of the pelvic floor, or to maintain in a normal position a uterus which has a tendency to flexions or displacements.

Pessaries must be regarded as a palliative method of treatment, though at times a radical cure may be affected by their means. In late years their use has been restricted by the introduction of operative measures, but operations are in some cases contra-indicated by the age or ill-health of the patient, or by her unwillingness to submit to them, whilst in other cases they fail to relieve the condition for which they are undertaken. Pessaries remain, therefore, indispensable, though they should be used as seldom as possible.

To be effectual, a pessary must answer the following requirements:

1. It must maintain the normal position of the uterus and vaginal walls, and relieve symptoms.

2. When it is in its place the patient should be unconscious of its presence.

3. It must be light, smooth, not acted upon by the uterine and vaginal secretions, and not irritating to the vaginal walls. The best materials for this purpose are aluminium, vulcanite, block tin, celluloid, and hardened indiarubber. The last three have the advantage that they can be moulded to any required form. In the case of celluloid and indiarubber this

is done by immersing them in boiling water, when they become soft, regaining their rigidity on cooling. There are three types of pessary in general use.

The Ring Pessary (Fig. 37).—This should be made of good hard rubber, with a central wire spring, so that it may be compressed to facilitate introduction, and may regain its shape when released.

It is used for **cystocele, rectocele** and **uterine prolapse** —*i.e.*, for hernia of the pelvic floor. It should not touch the bony parts of the pelvis, but should slightly stretch the lateral vaginal walls. It depends for its efficacy on the integrity of the posterior vaginal wall and the levator ani, and is useless when the perineum is much lacerated, for then it comes out as soon as the patient strains, as during coughing, sneezing, and defæcation. The same result follows if the ring be too small, whilst if too large it interferes with the action of the bladder and rectum, and may cause vaginal ulceration.

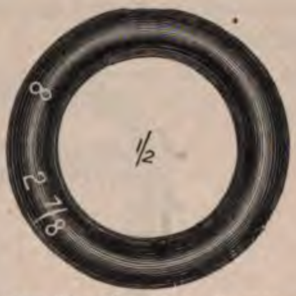


Fig. 37.—The Ring Pessary.

A rubber ring should not be left *in situ* longer than three months without being seen to, for the rubber tends to become rough and corrugated, leading to irritation of the vaginal mucous membrane and profuse leucorrhœa. In some cases this effect follows in three or four months; in others a pessary of the best rubber may be worn for a year without inconvenience.

The Hodge Pessary.—This is, in surface aspect, rectangular, with the angles rounded; in profile it resembles an opened-out S (Fig. 38). It is used for **backward displacements of the uterus, when the uterus is**

movable. It may be made of vulcanite, aluminium, celluloid, or block tin. The two latter will be found most convenient, as it is often necessary to slightly modify the shape to suit the requirements of the individual case. Various modifications of the original Hodge pattern are found (Fig. 39), but the important element of success in treatment by means of pessaries is that **the instrument should fit.**

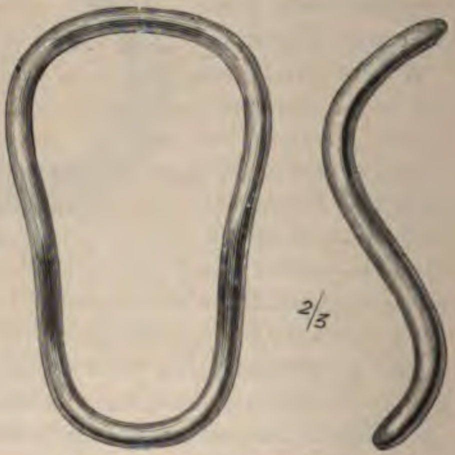


FIG. 38.—THE HODGE PESSARY.

Mode of Action.—Like the ring, the Hodge pessary should not touch any bony points. The action is described as that of a lever, the middle portion of the pessary resting against the posterior vaginal wall, and forming the fulcrum. The intrapelvic pressure acts in a direction downward and backward, mainly against the lower portion of the pessary, and this tends to tilt the upper end forward and upward, whereby the posterior vaginal fornix is pushed upward against the posterior surface of the body of the uterus. Another influence is exerted also: the cervix is drawn backward, and if the uterus be fairly rigid, the fundus is in this way tilted forward. The backward pressure of a heavy uterine body is also resisted, through the lever action of the Hodge pessary, by the anterior vaginal wall as long as this is not much relaxed. It is in harmony with this explanation that the crescent-shaped instrument is used, with the lower end pointing forward; but pressure on the urethra must here be specially guarded against.

The Vaginal Stem Pessary.—This consists of a cup or ring mounted on a stem, the lower end of which projects from the vulva, and has attached to it perineal bands which pass forward and backward to be fastened to the waistband (Fig. 40). Such an instrument is sometimes used for prolapse of the uterus or vaginal walls when the perineum is so deficient that a ring cannot be retained, and the age or other conditions of the patient do not allow of repair of the perineum. Zwancke's pessary is used for the same purpose, but has the disadvantage of being difficult to keep clean.

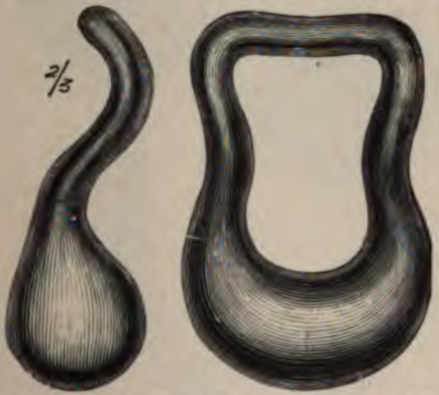


Fig. 39.—A Glycerin Pessary, Hodge Pattern.

Contra-indications to the Use of Pessaries.—Whatever the malposition of the pelvic organs, a pessary should not be introduced unless the malposition gives rise to symptoms. In the case of unmarried women pessaries are undesirable except when symptoms are severe and there is a strong probability of cure by their means. Inflammatory conditions of the genital organs contra-indicate the use of pessaries; pain and irritation would be the result. This remark applies to endometritis and erosion, as well as to pelvic cellulitis, ovaritis, and salpingitis. When the uterus is fixed, pessaries are harmful, as well as useless; no pessary can overcome adhesions. When the uterus is markedly retroflexed as well as retroverted it is useless to put in a Hodge pessary, unless the flexion be first corrected, for all that would result would be an anteversion with retroflexion.

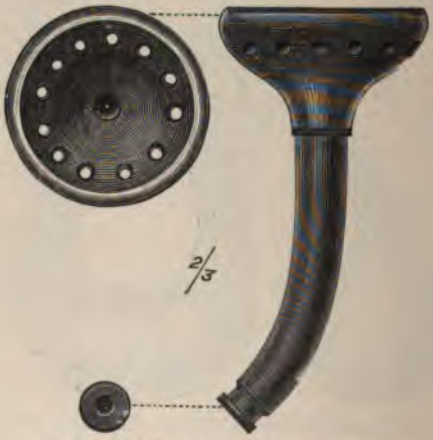


FIG. 40.—VAGINAL STEM PESSARY.

Retained Pessary.—The first effect of a pessary long retained is vaginitis; if the vagina has not been kept clean by douching, the discharges become purulent; the pessary hinders their exit, and comes to lie ultimately in what is practically an abscess cavity. The bad effects are aggravated by the contraction of the vaginal orifice which occurs at the menopause. If the pessary be a ring or a Hodge the vaginal wall in contact with it becomes ulcerated, so that there results a groove lined with granulations. These tend to grow up around the pessary, and may at length grow over and fuse, forming a bridge of tissue holding the pessary firmly imbedded in the vaginal wall. In the case of a flattened pessary with perforations the granulations may in like manner sprout and project through the perforations, forming bands between the anterior and posterior vaginal walls. Consequently, it may be no longer possible to remove the pessary without considerable violence, whilst this result is contributed to also by the narrowing of the vaginal outlet. The pus becomes offensive, and, if the cause of irritation be not removed, constitutional symptoms indicating septic absorption may arise.

As a result of prolonged ulceration of the anterior vaginal wall, vesico-vaginal fistula sometimes occurs. Similarly ulceration of the posterior vaginal wall may lead to a recto-vaginal fistula. The length of time required for a pessary to set up such ulceration varies with the shape of the pessary and with the frequency or otherwise of douching. In the absence of douching a few months may suffice for the production of a considerable groove, especially in the case of a tightly fitting pessary with a narrow edge.

The **dangers** of retained pessaries may be thus summed up:

1. Purulent vaginitis.
2. Urethritis.
3. Ulceration of the vagina.
4. Imbedding of the pessary in the vaginal tissues.
5. Vesico-vaginal fistula.
6. Recto-vaginal fistula.
7. Incarceration of the pessary from narrowing of the vaginal outlet.

CHAPTER XVIII

DISEASES OF THE UTERUS—(*Continued*)

INVERSION OF THE UTERUS

A UTERUS is inverted when it is turned inside out; this is true in two senses, for, as the organ inverts, its fundus passes into the vagina, and is protruded beyond the vulva.

Inversion of the uterus is only possible when its cavity is dilated—that is, after pregnancy, or when a polypus is present. In by far the greater proportion of cases the condition is a complication of delivery at term, and is nearly always due to an unskilled individual dragging upon the cord of a still adherent placenta. Although this variety of inversion belongs to the province of obstetrics, it is necessary to briefly review its leading features.

The inversion may be partial, the fundus not extending beyond the mouth of the uterus; it may extend through the os uteri into the vagina; or the inversion may be so complete that the uterus from mouth to fundus is turned inside out (Figs. 41 and 42). In a complete case of acute inversion, as it is called when it follows immediately on delivery, the outer surface is formed by the mucous membrane of the uterus, and is ragged, vascular, and bleeding, and the inner or uterine ostia of the Fallopian tubes are visible. The interior of this large sac is lined with peritoneum, and contains the round ligaments of the uterus with the Fallopian tubes. The ovaries, as a rule, remain on the edges of the sac. In some instances small intestine and omentum drop into the cavity. The manner in which the tubes and ligaments are drawn into the sac is illustrated in the specimen of partial inversion represented in Fig. 43.

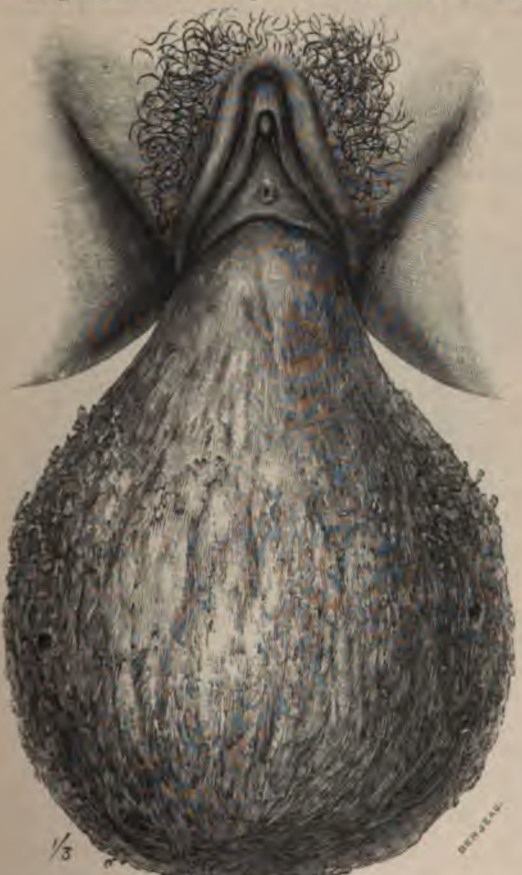


FIG. 41.—INVERSION OF THE UTERUS AND VAGINA. THE DARK SPOT ON EACH SIDE INDICATES THE ORIFICE OF THE FALLOPIAN TUBE (MUSEUM OF MIDDLESEX HOSPITAL).

It is common knowledge that when a body occupies the uterine cavity it stimulates the muscular walls to expulsive efforts. When the fundus is inverted, it is a solid body, which can be grasped and driven onward by the muscular efforts of the walls of the uterus, which may continue until the uterus turns itself completely inside out.

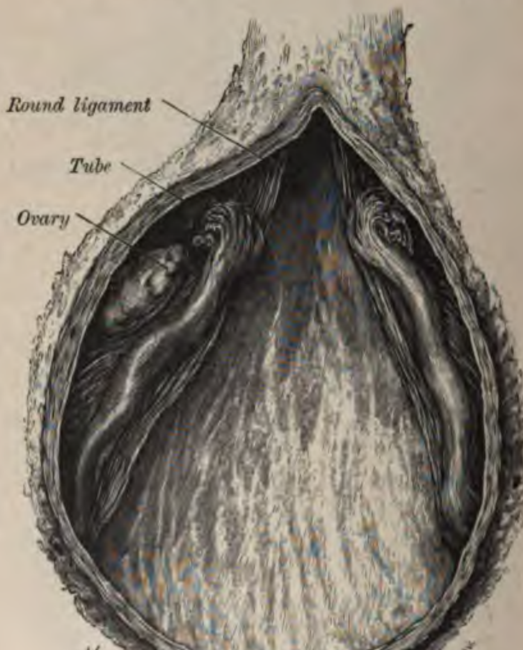


FIG. 42.—THE INVERTED UTERUS REPRESENTED IN PRECEDING FIGURE, OPENED FROM BEHIND.

This mechanism explains the method by which a submucous fibroid leads to inversion of the uterus. The presence of the tumour distends the cavity of the uterus, and the fibroid is pushed into the cervical canal by the muscular efforts of the uterus. This traction under favourable mechanical conditions produces inversion of the fundus, and finally the fibroid with the inverted fundus makes its appearance in the vagina or even protrudes beyond the vulva. When the inversion takes place gradually it is termed chronic.

Acute inversion of the uterus is always a grave accident; many patients die in a few hours from shock or loss of blood.

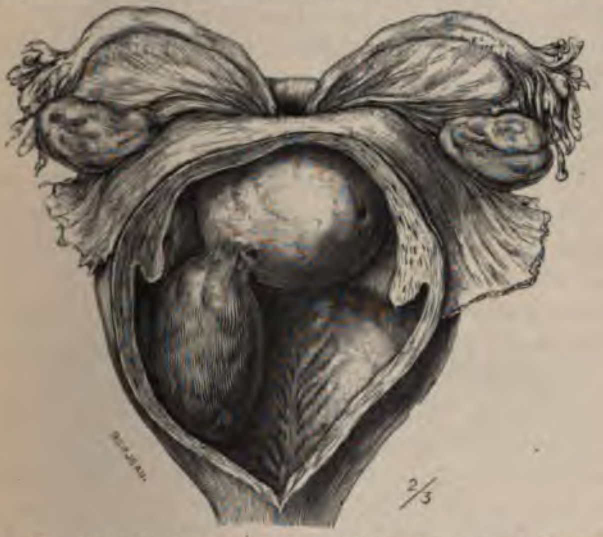


FIG. 43.—PARTIAL INVERSION OF A UTERUS DUE TO A FIBROID.

In years gone by the inverted mass has been cut away by practitioners in ignorance of the nature of the accident. When the patient escapes the immediate dangers, ulceration, sloughing, bleeding, and exhaustion destroy her in a few weeks or months.

Chronic inversion of the uterus has a different history. The patient suffers from menorrhagia, or metrorrhagia, leucorrhœa, and vesical troubles, which lead to an examination, and the tumour-like mass is detected in the vagina. In many cases its nature is recognised, but this is not always a simple matter.

Care must be exercised—

1. *To distinguish between an inverted uterine fundus and a uterine fibroid.*

2. *To recognise a case in which a fibroid is responsible for the inversion of the uterus.*

A submucous fibroid protruding through the mouth of the womb often strikingly resembles a partially inverted fundus.

In cases of acute inversion there should be no difficulty in diagnosis, but when the inversion is of long standing the exposed surface becomes greyish-white like skin.

In partial inversion great caution in diagnosis is necessary, but with the help of the sound the difficulty is easily surmounted. When the sound is introduced through the mouth of the uterus, between the inverted fundus and the uterine wall, it is arrested at less than its normal length; in the case of a fibroid it will pass to the full length, or more often to a greater distance.

In some cases, especially when the patient has a thin belly-wall, a cup-like depression can be felt to replace the natural convexity of the uterine fundus. Sometimes this depression can be detected by a finger introduced through the rectum. In doubtful cases an examination under ether is desirable, and, if necessary, the urethra can be dilated and the condition of the uterus determined by a finger introduced into the bladder.

Treatment.—In recent cases reduction of the inversion may often be effected by taxis. The patient is placed under an anæsthetic and steady pressure made by the fingers on the walls of the uterus, near the cervix. The principle on which taxis is applied for this condition is the same as that in reducing a hernia—namely, the part last inverted should be returned first.

When inversion is chronic, there appears to be more risk and difficulty in immediate reduction, and it is customary to use an instrument called a repositor (Fig. 44). This instrument consists of a perforated cup-shaped disc fitted on a stem which may be straight or furnished with a perineal and a pelvic curve. The lower end of the repositor permits of the attachment of elastic bands connected to a waist-belt supported by braces which pass over the shoulder. When in use the waist-belt is fitted to the patient and secured by the braces. The cup of the repositor is adjusted to the fundus of the inverted uterus, and the elastic bands fixed to the repositor and waist-belt maintain a continuous pressure. The patient is kept in bed, and, if the proceeding causes

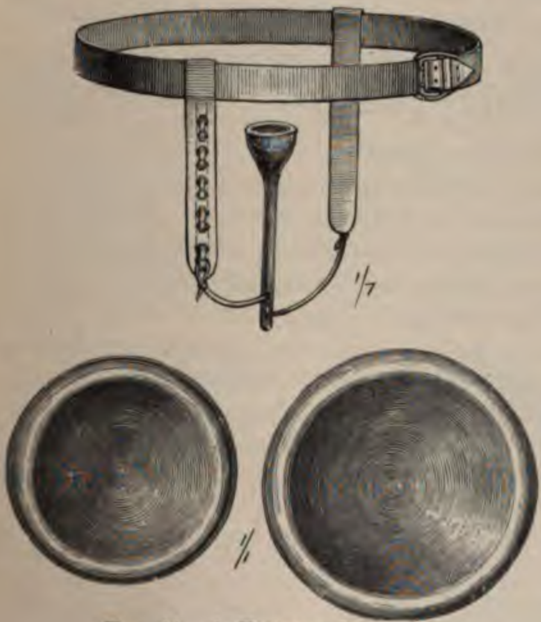


FIG. 44.—A UTERINE REPOSITOR.

pain, morphia injections may be given. At intervals of a few hours the amount of progress is observed, and the bands are readjusted. As soon as the fundus is reduced to the level of the internal os, it is desirable to change the cup of the repositor for a smaller one, for, when reduction is complete, a large cup is imprisoned in the uterine cavity, and is sometimes so firmly held as to cause difficulty and anxiety in its extraction. By means of the repositor an inverted uterus may be reduced in twenty-four or forty-eight hours, even when the inversion has existed for some years. When inversion is due to a fibroid, the latter is excised before reduction is attempted.

In some very obstinate cases, especially those in which the inversion has existed for many months, it has been found necessary to perform cœliotomy and incise the edges of the slit formed by the inverted uterus to facilitate its reduction (Brennan, Haultain).

In some difficult cases the uterus has been amputated. Severe measures of this kind are rarely necessary, but operative measures are occasionally found expedient even in the hands of the most experienced gynæcologists. (See Professor J. W. Taylor, *Trans. Obstet. Soc. London*, 1902, p. 299.)

CHAPTER XIX

DISEASES OF THE UTERUS—(*Continued*)

INJURIES OF THE UTERUS; DISEASES RESULTING FROM GESTATION.

Laceration of the Cervix. — *Causes.* — Laceration is sometimes produced by operations on the cervix, but in the vast majority of cases it occurs in childbirth. The immediate causes are precipitate labour, premature rupture of the membranes, a large or well-ossified fœtal head, and the application of forceps before dilatation of the cervix is complete. A natural labour may result in laceration when the distensibility and elasticity of the cervix are impaired by disease, such as carcinoma and chronic inflammation.

Results of Laceration.—When a cervix is torn (as during labour) the raw surfaces become covered by granulation, and later by cicatricial tissue, but as a rule they do not unite. The resulting fissure does not necessarily give rise to symptoms, even if deep or bilateral. For the cervical mucous membrane may gradually acquire the characters of the vaginal epithelium. The external os retreats, as it were, toward the internal, while the anterior and pos-

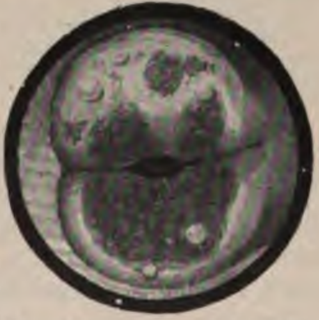


FIG. 45.—BILATERAL LACERATION OF THE CERVIX.

terior lips of the cervix become in reality lips or lappets, which can be readily separated (Fig. 45).

But the lesion may take a less favourable course. The exposed cervical mucous membrane may become unhealthy, either alone or as part of a general endometritis; it then becomes congested, and, in consequence, the cervical flaps become separated. The tendency to separation is exaggerated if there be a marked coincident flexion of the uterus. The everted and thickened mucous membrane is then bathed in the unhealthy secretions (arising partly from the uterus) found in the vagina. The congestion and œdema of the cervix commonly spread to the body of the uterus, which becomes heavy and enlarged, resembling the condition found in subinvolution. With the chronic endometritis and metritis so produced is frequently associated prolapse of the ovaries into the recto-vaginal pouch, especially when there is also retroflexion. The ovaries share in the congestion, and become unduly sensitive.

In the event of pregnancy, a deep bilateral laceration predisposes to abortion, and repeated abortions are sometimes due to this cause.

Signs and Symptoms.—A lacerated cervix does not, as such, give rise to symptoms, except, occasionally, bleeding in recent cases. Such symptoms as are present depend on the accompanying endometritis, and include leucorrhœa, aching over the sacrum, a feeling of weight and "bearing down" in the pelvis, and dyspareunia.

From time to time lacerations have been held responsible for many reflex neuroses. We believe this to be entirely erroneous, for although such neuroses have disappeared after repair of the cervix, the improvement must be attributed to the simultaneous curing of the inflammatory condition.

A laceration is readily detected by digital examination, and may be seen by the use of the speculum. Lacerations vary in nature and extent. There may be a split on one side only, the cleft extending only a short distance from the external os, or reaching up to the junction of the cervix and vagina. It is more frequent on the left side, running a little forward (Fig. 46, A), and sometimes bifurcated externally (Fig. 46, C); this is attributed to the greater frequency of the left occipito-anterior position of the child during delivery. A right occipito-posterior position will cause a laceration of the posterior lip on the right side (Fig. 46, B). In other cases this split is bilateral, so that the cervix presents well-marked anterior and posterior flaps; or several fissures may be found, radiating from the external os (Fig. 46, D). A Fergusson's speculum somewhat masks the extent of laceration by holding the lips in contact; a Neugebauer's or a duck-bill speculum and a hook give therefore a better view. The presence of a complicating endometritis will be determined at the same time.

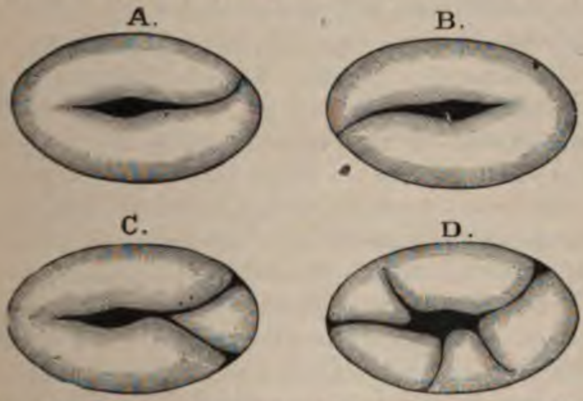


FIG. 46.—FOUR DIAGRAMS TO INDICATE THE POSITIONS OF CERVICAL LACERATIONS.

A bilateral laceration with considerable eversion of the mucous membrane may resemble adenomatous disease with but slight laceration, because the two lips cannot be brought together; on relieving the congestion by scarification the true condition will be recognised.

Treatment.—When no inflammatory conditions are present no treatment is required, except as a prophylactic measure. Inasmuch as laceration predisposes to endometritis and abortion, it may often be considered advisable to repair the rent with a view to diminishing the risk, especially when several abortions have already occurred.

When the laceration is followed by the more serious results above described, the operation of trachelorrhaphy or repair of the cervix is indicated.

Perforation of the Uterus.—This may occur as the result of the incautious use of the sound or of metallic dilators. Even when carefully used, a sound may pass through the uterine wall in some diseased conditions where the wall is soft, friable, or thin, as in sarcoma, carcinoma, and cystic degeneration of the chorion (hydatid mole). When this accident occurs the sound passes considerably beyond the normal distance, and its point may sometimes be felt under the abdominal wall. Bleeding may result, but it is seldom considerable. With a clean instrument and a fairly healthy uterus no untoward symptoms may follow, but in the opposite conditions septic peritonitis may be set up, with serious or fatal results.

DISEASES RESULTING FROM GESTATION.

Superinvolution.—This signifies premature atrophy of the uterus following delivery. It is brought about by debilitating causes, such as multiple and frequent pregnancies, post-partum hæmorrhage, and prolonged lactation. Sometimes there is no apparent cause.

Superinvolution is often permanent, leading to a premature menopause. The only symptoms are diminution or cessation of menstruation and sterility. On physical examination the uterus is found to be small. The diminution affects the substance of the uterine walls rather than the length of the cavity; consequently the bimanual examination gives more reliable information than the passage of the sound, and for the same reason extra care is required in the use of the sound, as the thin and often softened walls are easily perforated.

Treatment.—We must rely principally on hygienic measures and the administration of tonics; the prognosis, however, is not very favourable.

Subinvolution.—By this is meant a condition in which the return of the uterus to its proper size after delivery is arrested or delayed.

Causes.—Subinvolution may be due to—

1. Debility brought about by malnutrition, by a severe and lengthy labour, by post-partum hæmorrhage, or by too early resumption of active duties after delivery; non-suckling probably predisposes to subinvolution.

2. Chronic endometritis preceding labour. Post-partum hæmorrhage is very likely to occur in such a case, and it must then be regarded, not as the cause of subinvolution, but as the result of conditions leading also to subinvolution. Indeed, it is possible that the relation of hæmorrhage and subinvolution should always be regarded in this way.

3. Puerperal (septic) endometritis.

Pathology.—Subinvolution presents two varieties, depending on its origin, whether inflammatory or trophic. In the trophic variety the muscle fibres are large and pale, and the intermuscular tissue and mucosa are œdematous. The vessels and lymphatics are dilated from the want of proper muscular contraction. For the pathology of the inflammatory variety see Chapter XX.

Signs and Symptoms.—Besides general weakness, the symptoms are: abundance and long duration of the lochia, irregular losses after the lochia proper have ceased, profuse leucorrhœa, a feeling of weight in the pelvis, and backache. On examination the vagina is bathed in discharge of a serous or sero-purulent character, sometimes tinged with blood. The uterus is large, heavy, and flabby, and not uncommonly retroverted.

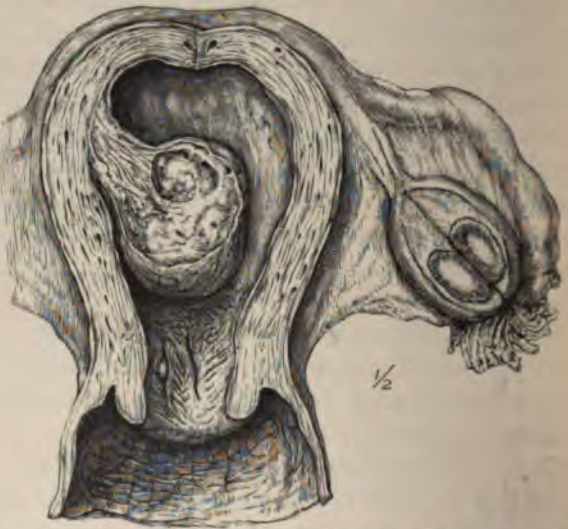


FIG. 47.—RETAINED FRAGMENT OF PLACENTA (MUSEUM OF ROYAL COLLEGE OF SURGEONS).

The condition must be diagnosed from retention of products of conception; in the latter case bleeding is more marked, but otherwise the signs and symptoms are so similar that exploration of the interior of the uterus may be required to establish the diagnosis.

Treatment.—The general treatment should be tonic, with rest in bed. Hot intra-uterine and vaginal douches should

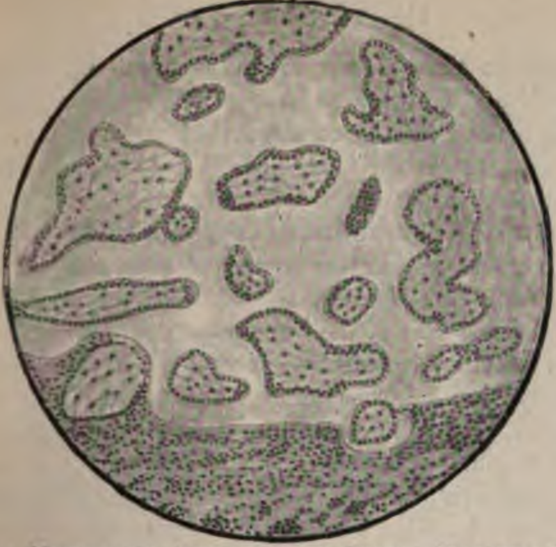


FIG. 48.—MICROSCOPIC APPEARANCE OF RECENT PLACENTAL TISSUE.

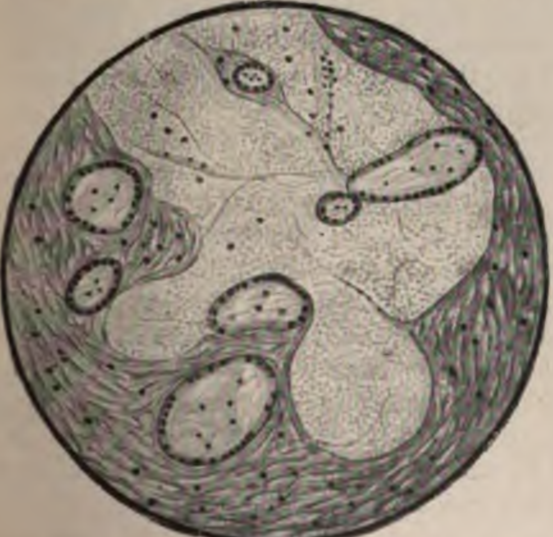


FIG. 49.—MICROSCOPIC APPEARANCE OF PLACENTAL TISSUE LONG RETAINED IN THE UTERUS.

be given, as these induce uterine contractions, which play an important part in the process of involution. In more chronic conditions hydrotherapeutics and change of air are indicated. In the way of medicines ergot may be given in combination with iron.

Retention of Products of Conception.—A portion of placenta or of membranes may remain attached to the uterine wall, both after full-time delivery and after abortion. It is most frequent in the latter case. The principal symptom is irregular hæmorrhage, continued in some instances for many months. The other symptoms and the physical signs closely resemble those just described as resulting from subinvolution.

The diagnosis generally rests between retention of placental fragments (Fig. 47), a small submucous myoma, and sarcoma. In any case, the diagnosis cannot be made with certainty without exploration of the interior of the uterus. The microscopic characters of recent placental tissue are shown in Fig. 48, and those of such tissue when retained for some time in the uterus in Fig. 49.

Treatment.—When symptoms are not urgent, palliative measures may be adopted, such as the administration of ergot and iron, and vaginal douches. But if there be reason to suppose, at the outset, that retained products are present, there is no object in delay; and the uterine cavity should be explored. Shortly after a labour or miscarriage the cervix may be sufficiently patulous to allow of this being done without dilatation. In other cases dilatation must precede exploration, which should be done by means of the finger in the uterus. If placental fragments are found, a blunt curette should be used to remove all rough and protruding parts of the surface until the interior is quite smooth.

CHAPTER XX

DISEASES OF THE UTERUS—(*Continued*)

DISEASES OF THE ENDOMETRIUM AND FIBROSIS OF THE UTERUS.

THE mucous membrane lining the cavity and the cervical canal of the uterus is termed the **endometrium.** It differs from mucous membranes in general in having no submucous layer. This is due to the fact that nearly the whole of the muscular tissue of the uterus is morphologically muscularis mucosæ (John Williams). Comparative anatomy supports this view. The endometrium is peculiar in undergoing rhythmic changes during sexual life coincident with menstruation. When the uterus is occupied by an oösperm (fertilized ovum) the endometrium of the uterine cavity is changed into a thick membrane known as a **decidua,** which is incorporated with the placenta. Menstrual and decidual changes are entirely confined to the endometrium lining the uterine cavity. The mucous membrane lining the cervical canal is called the **cervical endometrium.** The endometrium of the uterine cavity has a smooth surface; it is soft, spongy, pale red, and covered with ciliated columnar epithelium. The glands which beset it are simple tubes lined with a single layer of columnar cells continuous with those on the surface; the cells near the orifices of the glands are ciliated. The glands dip obliquely into the stroma of the mucous membrane, and sometimes bifurcate at the extremity. The cervical endometrium is firm, and forms rugæ, giving rise to an appearance known as the *arbor vitæ*. The orifices of the racemose glands open on the surface in the pits between the rugæ. The epithelium in the upper half of the cervical canal is of the columnar ciliated variety; in the lower half it is stratified. In addition to the glands, the mucous membrane of the lower part of the canal contains numerous vesicles visible to the naked eye, and known as the *ovules of Naboth*.

The endometrium is liable to the following diseases: (1) Inflammation; (2) adenomatous disease; (3) tuberculosis; (4) sarcoma; (5) carcinoma.

Acute Endometritis.—The chief causes are sepsis (infection with micro-organisms) following labour or abortion, instrumental interference with the uterus, extension of vaginitis or gonorrhœa, or infection and gangrene of a uterine myoma.

When inflamed, the endometrium presents the usual characters of an inflamed mucous membrane; it is swollen, and the surface is covered with a purulent exudation. On microscopic examination its tissues are found infiltrated with leucocytes, and if submitted to bacteriological examination the infiltrated tissues and discharges will occasionally furnish the micro-organism which initiated the disturbance. The great difficulty which besets the study of morbid states of the endometrium is the fact that in order to examine it the cervical canal must be dilated. Even then the information can only be acquired by the finger, or more directly from the study of fragments removed from it by means of the curette.

In recent years a good deal of useful work has been accomplished, and we know that acute endometritis following on labour and abortion—" puerperal endometritis," as it is called—is caused by the introduction of pathogenic micro-organisms, such as the streptococcus and staphylococcus, to lack of scrupulous aseptic precautions on the part of)r, midwife, or nurse. These minute bodies flourish in lischarges, and lead to decomposition of blood-clot or nents of placenta which may be retained in the uterine y. The ultimate course and consequences of endometritis rring during the puerperium, or as a sequence of opera- on the uterus, or due to gangrene of a myoma, or exten- of gonorrhœa, are much the same.

many cases, especially when the infection is of a mild the inflammation subsides, and, like those conditions l catarrh, leaves no trace. In others the inflammatory ges may extend beyond the mucous membrane into the ular wall of the uterus, and even involve its serous ing. When endometritis involves the deeper parts of iterus in this way it is sometimes called metritis (an cessary refinement). In severe, and especially in puer-, cases, a septic thrombosis is set up in the uterine veins, thence the organisms or their products are distributed ie system generally, leading to septicæmia or pyæmia. n the infection is exceedingly virulent, it will lead to rene and sloughing of the endometrium.

other serious consequence of the disease is due to its ision to the mucous membrane of the Fallopian tubes; the infectious material finds its way directly into the c section of the cœlom (peritoneal cavity), and in many nces with a fatal result. (This disaster is discussed in hapter devoted to Salpingitis.)

mptoms.—Constitutional disturbance is the rule. The erature ranges from 99° or 100° to 105° F., and rigors iot uncommon. Apart from the febrile disturbance, the nt complains of pelvic pain and profuse, offensive, puru- and sometimes blood-stained discharges.

ns.—On examination the vagina is hot, and before the of abundant discharge may be dry. The uterus feels

A. R. SPALDING, M. D.

heavy and bulky, and is tender to manipulation. Later it becomes fixed if pelvic cellulitis supervenes. The cervix is at first soft, but later it is hard and firm. Viewed through the speculum, the cervix appears red and thickened, and mucus, either viscid, muco-purulent, or sanious, is seen to exude from the external os.

Diagnosis.—The history and the febrile condition will point to the diagnosis, and lead to vaginal examination, when the above conditions will be found.

Course and Prognosis.—Acute endometritis of puerperal origin is the only variety which is at all frequently fatal, and then the fatal result depends more on general than on local conditions. In all other cases the tendency is to recovery after a more or less protracted convalescence. The most serious complications are pelvic peritonitis and cellulitis, pyosalpinx, and sterility. Uncomplicated endometritis results usually in a chronic hyperplasia, which produces a feeling of aching and weight in the supra-pubic region, backache, and leucorrhœa, favours displacements, and may induce dysmenorrhœa and sometimes sterility.

Treatment.—The patient must be kept in bed, and the usual treatment of febrile conditions adopted. For the treatment of puerperal septicæmia the student is referred to text-books of obstetrics.

Local Treatment.—At the outset intra-uterine irrigation should be resorted to, using for this purpose solutions of perchloride of mercury (1 in 5,000), carbolic acid (1 in 40), nitrate of silver (1 in 500), or chloride of zinc (1 per cent.). The irrigation may be followed by the introduction of iodoform pencils into the uterine cavity, or by swabbing out the uterus with a stronger caustic, such as iodized phenol (iodine, 1 part; carbolic acid, 4 parts), liniment of iodine, or chloride of zinc, 10 per cent., applied on an intra-uterine probe swathed with cotton-wool.

Some have strongly recommended curetting for gonorrhœal endometritis; there is, however, the risk of opening up fresh surfaces to infection; and the same objection applies to dilatation of the cervical canal for intra-uterine medication. The risk may be diminished by following up the curetting by swabbing out the uterine cavity and the introduction of iodoform pencils.

As the vagina is often also affected, more especially in gonorrhœal cases, it must be treated at the same time, as previously described.

Much benefit is derived in the earlier stages from scarification of the cervix and the abstraction of blood. This answers better than leeches, which were formerly used for this purpose. It may require to be repeated several times, at intervals of a few days.

The after-treatment consists in the employment of hot vaginal douches of weak antiseptics twice daily. After each douche an iodoform tampon may be placed in the vagina, or a glycerin tampon dusted over with iodoform.

In addition to or in place of the vaginal douches hot sitz-baths may be given. Pain is greatly relieved by fomentations applied to the lower part of the abdomen and to the perineum. In other cases morphia suppositories may be introduced into the rectum, or opium given by the mouth.

Chronic Endometritis.—*Causes.*—(1) This disease may be a sequela of the acute form; (2) it may be due to gonorrhœa or sepsis, without a preliminary acute stage; (3) it may result from chronic congestion, due to catching cold during a menstrual period, or caused by acute retroflexion of the uterus; (4) it may result from abortion or delivery at term, when it takes the form of subinvolution.

Pathology.—The changes found in the mucosa are similar o those that occur in acute endometritis, but they are less marked. Moreover, several varieties are described, according to the structures principally affected.

(*a*) *Glandular Endometritis.*—The glands are enlarged and dilated, and their lumen is occupied by proliferating and cast-off epithelium, mixed with mucus (Fig. 50). This condition must be distinguished from adenomatous disease of the endometrium (p. 194), in which there is a new formation of glandular elements.

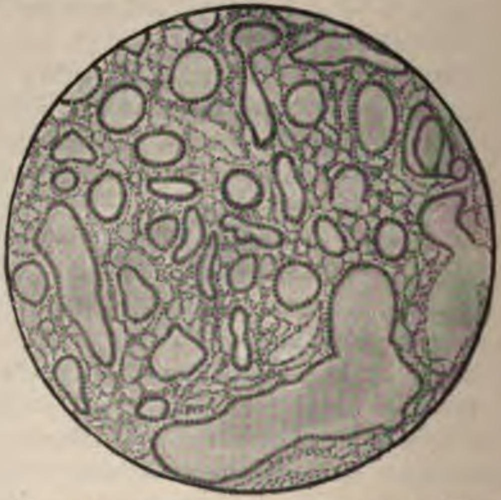


FIG. 50.—MICROSCOPIC CHARACTERS OF GLANDULAR ENDOMETRITIS.

(*b*) *Interstitial Endometritis.*—Here the glands are not directly affected, but the stroma shows at first increase in its cells and infiltration of leucocytes, and later a great formation of fibrous tissue. The vessel-walls are thickened, and small retention-cysts are formed in the deeper layers by pressure on the gland ducts. Eventually the glands may almost disappear, the mucosa consisting chiefly of fibrous tissue.

(*c*) *Hæmorrhagic Endometritis.*—The principal alteration is in the vessels, which are dilated and, in places, ruptured, leading to extravasation of blood in the superficial layers of the stroma. There is no polypoidal formation, such as is found in the adenomatous condition to which the same name is sometimes applied (see p. 195).

These three conditions are sometimes found associated in the same specimen, and the endometrium of the cervix and body may be affected separately or together.

The *symptoms* and *signs* are practically those of adenomatous disease, and similar local treatment is required.

(*d*) *Villous Endometritis and Senile Endometritis.*—A careful examination of the endometrium from cases considered on clinical signs to be typical instances of these conditions have, in all the examples we have submitted to microscopic examination, proved to be carcinoma of the endometrium.

Fibrosis of the Uterus.—Under this term we propose to describe a morbid condition of the uterus which presents the following characters:

The patients are usually multiparæ between thirty-five and forty-five years of age, but the condition is also met with in younger women, and in nulliparæ. They complain of menorrhagia which lasts from fourteen to eighteen days. At times the bleeding is so profuse as to place life in danger.

The uterus is enlarged, and the cervix is hard to the touch. When the cervical canal is dilated the tissue of the cervix tears rather than stretches; the endometrium is quite smooth, but the walls of the uterus are hard and resisting, and the curette makes a harsh grating sound in passing over it, and brings very little tissue away.

The structural changes are very striking; the uterus is larger than usual, and its walls are thick and tough. On section the arteries stand out prominently, exposing their thickened walls. On microscopic examination the muscle tissue of the uterus is seen to be replaced by an abnormal growth of fibrous tissue. The walls of the uterine arteries are very thick, and the lumina of the vessels much narrowed and sometimes obliterated. The glands of the endometrium are markedly atrophied, so that the mucosa presents a much thinner layer than the normal.

The changes in the tissues of the uterus are analogous to the curious fibrotic changes which occur in the walls of the cardiac ventricles as a sequel of syphilis. In the uterus the changes are probably a remote consequence of septic endometritis.

Treatment.—In severe cases drugs are of no value; curetting sometimes arrests the bleeding for a few months. Bilateral oöphorectomy has no influence on the bleeding. In desperate cases it has been necessary to perform hysterectomy.

Tuberculosis.—This disease may attack any part of the endometrium; it occurs more frequently in the mucous membrane of the uterine cavity than in that lining the cervical canal. Nothing is known of its early stages, for the majority of cases do not come under observation until the disease has reached its caseous stage and has infiltrated the muscular wall of the uterus. Occasionally isolated nodules are found in the endometrium. The infection is very liable to spread to the Fallopian tubes and infect the peritoneum; on the other hand, when the disease arises in the tubes it will extend to and involve the endometrium (see p. 266).

Tuberculosis of the endometrium is not frequent as a primary disease, but in many cases, especially in children, it is associated with tubercular lesions in the lungs and bones.

It is by no means easy to demonstrate the presence of bacilli in the uterine lesions; the same holds true of the tubes, but when tubercular lesions are found in other parts of the body as well as the uterus, and yield tubercle bacilli to appropriate tests, the inference that the uterine lesions are likewise tubercular is a fair one.

Tuberculosis of the endometrium is found in children, and may occur in the first year of life. This is a fact of some importance in opposition to the theory that infection is conveyed with the semen during coitus.

Tuberculosis of the uterus is very rarely made out during life; its presence may be suspected in the case of girls and young virgins with a persistent purulent vaginal discharge, especially if tubercular foci can be localized in their lungs or bones.

Treatment.—This disease is so seldom diagnosed that radical measures have rarely been practised on the endometrium (see Tuberculosis of the Fallopian Tubes).

An admirable summary of our knowledge regarding genital tuberculosis in the female is furnished by Comyns Berkeley, *Journal of Obstetrics and Gynæcology of the British Empire*, January, 1903.

Foreign Bodies in the Uterus.—Various kinds of foreign bodies are occasionally found in the uterus. They consist of fragments of a metal sound, catheters, sponge or laminaria tents, an electrode, or a piece of silk used to ligature the pedicle of a polypus. Even pessaries of various kinds have been removed from the cavity of the uterus. Portions of the fœtal skeleton, such as a parietal bone, or the shaft of a femur have been left after craniotomy. Miscellaneous things have been introduced for the purpose of procuring abortion, such as hairpins, catheters, indiarubber tubing, knitting-needles, a goose-quill, etc.

Symptoms.—As a rule, the foreign body sets up irritation and suppuration; the profuse discharge of pus leads to an examination and detection of its cause.

Treatment.—The offending body should be removed as soon as possible; this is a proceeding which at times requires some ingenuity.

Abscess of the Uterus.—A collection of pus in the walls of the uterus is very rare; it has been observed as a sequel of gonorrhœa complicating the puerperium, and as a sequel of gonorrhœa apart from pregnancy (Author). The symptoms are those characteristic of septic infections of the uterus with local infection of the peritoneum. The abscess may burst into the peritoneal cavity, the rectum, or bladder. The prognosis is very grave.

CHAPTER XXI

DISEASES OF THE UTERUS—(*Continued*)

DISEASES OF THE ENDOMETRIUM.

(*Continued*).

Adenomatous Disease (formerly called *Erosion*) **of the Cervical Endometrium.**—The mucous membrane covering the neck of the uterus consists of two portions: one lines the cervical canal—the *cervical endometrium*; the other covers the vaginal portion of the cervix and belongs to the vagina. The two portions meet at the external os. "The mucous membrane covering the vaginal aspect of the cervix is really a cup of stratified epithelium, resembling a tailor's thimble, which fits on the lower end of the uterus." It contains a few simple glandular crypts. The cervical endo-

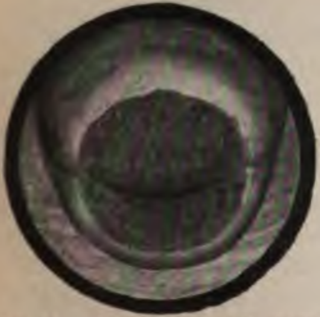


FIG. 51.—ADENOMATOUS DISEASE OF THE CERVIX.

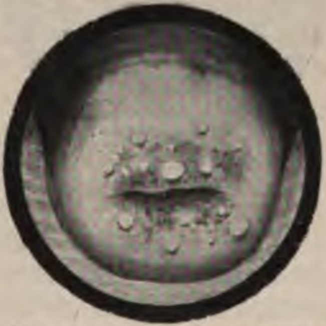


FIG. 52.—ADENOMATOUS DISEASE OF THE CERVIX, WITH DISTENDED FOLLICLES.

metrium in its lower segment is beset with racemose glands and the ovules of Naboth. The glands of the cervical endometrium are very apt to enlarge and multiply, forming a soft, velvety, pink mass which extends beyond the normal limit of the external os and invades the tissue of the vaginal portion of the cervix, forming a soft, velvety areola, in colour like a ripe strawberry, and minutely dotted with spots of a brighter pink. This condition was formerly erroneously called ulceration (Fig. 51). The surface is usually covered with tenacious mucus.

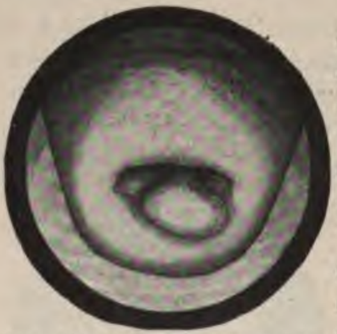


FIG. 53.—MUCOUS POLYPUS OF THE CERVICAL ENDOMETRIUM.

This pink tissue is composed of glandular acini lined with columnar epithelium. In cases of bilateral laceration of the cervix the whole of the exposed surface is generally tumid with this overgrown glandular tissue.

Occasionally this glandular overgrowth projects as a pedunculated process from the mouth of the uterus, and is then termed a mucous polypus; two or more may be present. They are dotted with minute pores indicating the orifices of the glands, and are soft. They usually spring from the endometrium near the os, which is generally patulous when these pedunculated adenomatous bodies are present (Fig. 53). Histologically, they are composed of an axis of fibrous and muscular tissue covered with mucous membrane. As long as the bodies remain in the cervical canal, the mucous membrane covering them possesses a single layer of columnar epithelium, but when the polypus projects into the vagina the mucous membrane of the protruding portion loses its glands, or they become mere crypts, and the epithelium stratifies.

In some instances the pink tissue is small in quantity and is dotted with numerous cystic bodies of the size of coriander seeds; these are enlarged ovules of Naboth, and are probably due to distension of the acini of the cervical glands. When the adenomatous surface is extensive and the follicles are numerous, the white dots on a pink ground produce a characteristic appearance (Fig. 52).

In very rare cases a group of follicles will hang as a grape-like mass in the vagina. These may be called **racemose adenomata.**

Causes.—Nothing is known concerning the cause of this affection. It occurs in virgins and in mothers; extensive adenomatous patches are often associated with lacerations of the cervix, and the disease is more common in women who have had children than in nulliparæ.

Symptoms.—Adenomatous disease of the cervix gives rise to vaginal discharge, indefinite sacral pain, and general weakness.

The discharge is commonly known as "the whites"; technically it is termed *leucorrhœa.* The normal secretion is clear and viscid like the white of an egg, but in marked cases of adenomatous disease it may be yellow or green. Pain usually assumes the form of backache; often it is referred to the submammary region, and occasionally to the perineum. Pruritus is sometimes present. The continual discharge weakens the patient and leads to many subjective symptoms, such as nausea, headache, giddiness, sleeplessness, and similar disturbances, often attributed to hysteria and vaguely classed as neuroses.

Diagnosis.—On inspecting the vulva, traces of the discharge are usually visible externally. On examining with the finger, the cervix may feel enlarged and softer than usual; the uterus may be bulky. On introducing a speculum, tenacious secretion will be seen covering the exposed surface or issuing from the cervical canal. This is removed by a cotton-wool dab, and the presence, extent, and character of the adenomatous tissue determined, as well as the existence and degree of any co-existing laceration. The condition most likely to be confounded with this disease is carcinoma of the cervix.

Treatment.—When the disease is of small extent it is easily dealt with in the following manner: The parts are well exposed by means of a Fergusson's speculum, and the mucus removed by means of cotton-wool dabs on sponge-holders or speculum-forceps. Iodized phenol (iodine 1 part, carbolic acid 4 parts) is then freely applied to the diseased surface by means of cotton-wool wound on a uterine probe; it is useful to apply some of the caustic for a short distance up the cervical canal by means of the probe. If there be any conspicuous follicles they should be punctured. A tampon is then introduced, and the patient directed to take it out next morning, and then to douche the vagina daily, to keep the bowels open by means of simple saline purges, and to abstain from alcohol. When the disease is extensive, it may require several applications at intervals of two or three days; but in severe cases better results are obtained by placing the patient under ether and thoroughly scraping away the adenomatous tissue with a curette, taking care to deal with the whole length of the cervical canal, and then applying iodized phenol, or any suitable caustic to the denuded surface. Radical treatment of this kind entails rest in bed for a week or ten days.

When adenomatous disease is associated with bilateral laceration and is clearly a source of suffering, the performance of trachelorrhaphy is indicated.

Adenomatous Disease of the Corporeal Endometrium.—The endometrium lining the cavity of the uterus is beset with tubular glands, which, like the glands of the cervical endometrium, may undergo local enlargement and form sessile or pedunculated processes known as mucous polypi. They possess a covering of columnar epithelium and a framework of connective tissue containing glands identical with the tubular glands of the endometrium (Fig. 54). Sometimes there is a general adenomatous condition of the endometrium without any definite polypoidal formation.

This disease is sometimes described as villous or polypoid endometritis. When menorrhagia and metrorrhagia are prominent symptoms, it is sometimes referred to as hæmorrhagic endometritis.

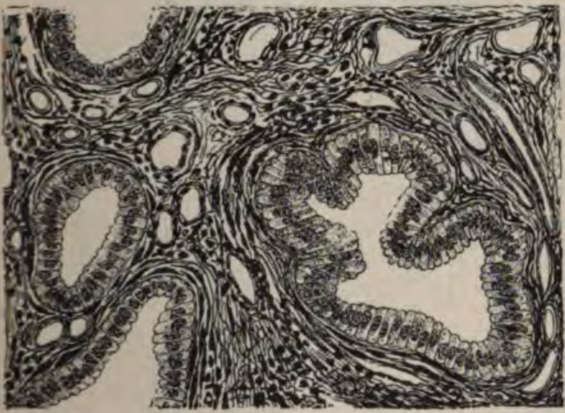


FIG. 54.—MICROSCOPIC APPEARANCES OF A PEDUNCULATED ADENOMA OF THE ENDOMETRIUM.

Symptoms.—These consist of a uterine discharge, which may be mucoid, muco-purulent, or bloodstained. In many cases there is a distinct history of menorrhagia.

Diagnosis.—On examination the uterus is usually enlarged, and the introduction of the sound is followed by a slight loss of blood.

In many cases the only way of actually determining the nature of the case is to anæsthetize the patient, dilate the cervical canal, and explore the endometrium with the finger. Should any polypi be detected, they are easily detached by means of the curette.

Treatment.—This turns upon the diagnosis, and is usually carried out at the time the uterus is dilated; it consists in completely removing the polypus or polypi, and curetting the whole endometrium and applying iodized phenol.

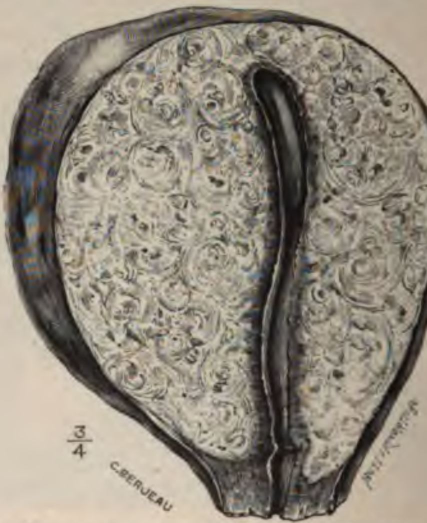


FIG. 55.—A UTERUS IN SAGITTAL SECTION ENLARGED BY DIFFUSE ADENOMYOMA.

From a patient aged forty-nine years; mother of four children. A small fibroid occupies the fundus.

Adenomyoma of the Uterus.—This term is applied to a pathological condition of the uterus which in its clinical and naked characters resembles very strongly a submucous fibroid, but it lacks the one feature which is so typical of a fibroid—namely, encapsulation. The disease is most commonly met with between the twentieth and fiftieth years, and causes obvious enlargement of the uterus, profuse and in some instances uncontrollable menorrhagia. When the uterus is removed and divided longitudinally the walls are found greatly thickened, and in well-marked cases may exceed two inches in thickness; this increase is due to the formation of new tissue between the outer wall of the uterus and the superficial layer of the endometrium.

The new tissue consists mainly of plain muscle fibres which, instead of forming vortices, as is so common in the hard fibroid, are disposed in an irregular manner, and the spaces between the bundles of muscle fibres are filled with the peculiar stroma of the uterine mucosa containing gland tubules lined with columnar epithelium, and of the same type as the normal tubular glands of the endometrium. The glandular elements appear to be uniformly distributed throughout the adventitious tissue, and can be detected up to the limits of the thin muscular stratum underlying the peritoneal coat of the uterus. The amount of the glandular elements varies widely in different cases.

The condition has been particularly studied by Cullen, and he admirably summarizes its leading features in the following terms: "It is diffuse in character, situated in the middle layer of the uterine wall, and is dependent on the uterine mucosa for its glandular elements. Its peculiarities are well expressed in its name, *adenomyoma uteri diffusum benignum.*

Clinically this disease is apt to be mistaken for submucous or interstitial fibroids, or cancer of the body of the uterus.

Treatment.—Vaginal or abdominal hysterectomy, according to the circumstances of the case.

The attention of British gynæcologists has been drawn to this disease through a paper by Dr. S. J. Murdoch Cameron and Mr. Frank E. Taylor, in the *Journal of Obstetrics and Gynæcology of the British Empire*, March, 1904.

CHAPTER XXII

DISEASES OF THE UTERUS—(*Continued*)

FIBROIDS.

THE tumours of the uterus known as fibroids, myomata, or fibromyomata, are extremely common, and on account of the difficulties and dangers which arise from them directly and indirectly, their pathological and clinical aspects have been studied with very great care. Before minutely describing the structural peculiarities of fibroids, it will be of some advantage to study their topography and gross anatomy. Though fibroids arise in every part of the uterus, including the round ligament, they are more common in the body of the organ than in its neck. Those which arise in the cervix offer peculiar features, and demand separate consideration.

FIBROIDS OF THE BODY OF THE UTERUS.

These tumours arise in the body of the uterus in three situations: (1) In the true uterine tissue; such are said to be intramural or interstitial. (2) In the endometrium; these are called submucous. (3) In the subperitoneal layer; these are termed subserous. Fibroids may arise in, and remain confined to, any one of these layers, or they may occur in all three situations in the same individual, and there is no limit to their number (Fig. 56).

1. *Intramural Fibroids.*—These, when small, resemble knots in wood; they possess distinct capsules, and are hard to the

touch. The bundles of muscle fibres are usually interwoven in such a manner that they present on section a peculiar whorled arrangement. There is no limit to their growth, and they sometimes attain huge proportions.

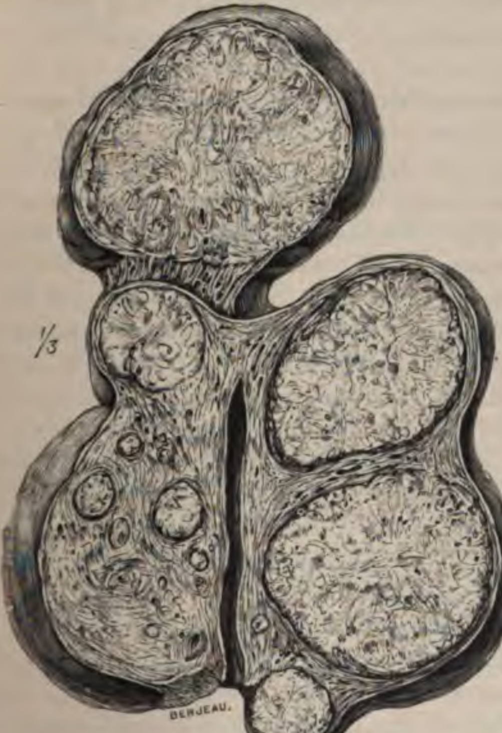


FIG. 56.—UTERUS IN SAGITTAL SECTION, SHOWING INTRAMURAL AND SUBSEROUS FIBROIDS.

In texture they vary greatly. Some are as hard as cartilage, and contain a large proportion of fibrous tissue (fibromyomata), and grow slowly. Many are soft and even gelatinous; others are very vascular, and grow rapidly; indeed, some intramural fibroids may be so rich in bloodvessels that on section they look not unlike cavernous nævi, and furnish a loud venous hum on auscultation.

Sometimes a fibroid confined to one wall of the uterus will appear simple, but on section it will be found to consist of two or more tumours, each possessing its own capsule (conglomerate fibroid).

2. *Submucous Fibroids.*—These arise in the deeper layers of the endometrium, and, as soon as they attain an appreciable size, project into the uterine cavity. Many of them remain sessile, but the majority tend to become stalked, and are then termed polypi. Whether sessile or stalked, they are invested by endometrium. A fibroid in the wall of the uterus or projecting into its cavity leads to great thickening of the uterine wall, accompanied by increased vascularity, which is often manifested by menorrhagia and intermenstrual hæmorrhage—metrorrhagia.

The pedicle of a submucous fibroid may be long enough to allow the tumour to be extruded into the vagina, and it may project beyond the vulva. When this happens an interesting change takes place in the character of the epithelium of the extruded part. So long as the tumour remains within the cavity of the uterus, the epithelium covering it is indistinguishable from that lining the cavity of the uterus. When the tumour enters the vagina the cells covering the extruded portion become stratified on all those portions subject to pressure, but the epithelium in the glandular recesses remains columnar and ciliated.

The extrusion of a fibroid through the cervical outlet sometimes ends in its complete detachment; this is of course curative. More often the extrusion leads to secondary changes inimical to life. When a stalked fibroid escapes from the cervical canal, its pedicle is firmly grasped by the cervix; this interferes with the circulation in the tumour, leading to œdema and gangrene of the fibroid; the dead mass becomes infected with putrefactive organisms, decomposes, and sets up septic changes in the uterus leading to sloughing of the endometrium, salpingitis, peritonitis, and death.

3. *Subserous Fibroids.*—Like the submucous variety, these tend to become pedunculated. As many as fifteen or twenty of these bodies may be counted on the peritoneal surface of the uterus varying in size from a pea to a walnut. The small tumours rarely cause inconvenience.

Any of the varieties of fibroids may occur together in the same uterus; indeed, it is usual to find the subserous and intramural varieties associated. Intramural fibroids are often solitary, but it is by no means rare to find a moderately large tumour in the uterine wall accompanied by a small submucous fibroid, and the latter is far more frequently the source of dangerous bleeding than its large companion. Sessile subserous fibroids may attain large dimensions.

FIBROIDS OF THE NECK (CERVIX) OF THE UTERUS.

Two topographical varieties of fibroids occur in the neck of the uterus. Those which invade the cervical canal are called intracervical or submucous (Fig. 57); the fibroids which grow from the periphery of the cervix and do not invade the canal, but burrow under the peritoneum on the anterior or the posterior aspect of the uterus, are known as subserous cervical fibroids (Figs. 58 and 59).

A submucous cervical fibroid is ovoid, and the uterus perched upon its summit is sometimes carried out of the pelvis, and may reach as high as the navel. The topography of cervix fibroids is best displayed when the parts are sectioned, for when large enough to fill the true pelvis they display a very characteristic elliptic outline.

The submucous variety of cervical fibroids is surrounded by the expanded and attenuated walls of the cervix.

The ovoid shape of cervix fibroids is determined by the osseous boundaries of the true pelvis. In a woman with an average pelvis, the pelvic diameters at the level of the middle of the cervix measure with the soft parts in position about 10 centimetres (4 inches); hence a cervical fibroid with this diameter, whether intracervical or subserous, will completely occupy the true pelvis and exert injurious pressure on the ureters, but more especially on the urethra.

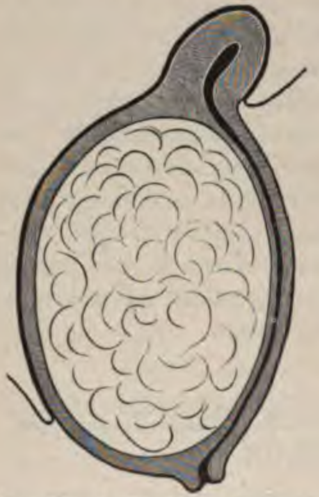


FIG. 57.—A DIAGRAM TO SHOW THE RELATION OF AN INTRACERVICAL FIBROID TO THE CERVICAL CANAL.

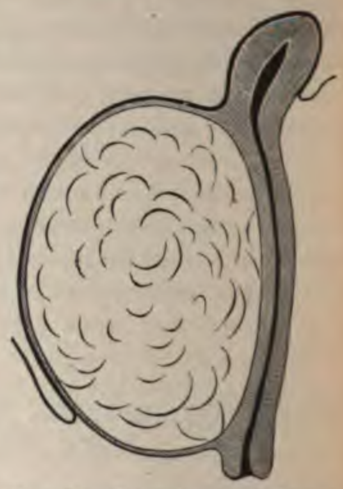


FIG. 58.—DIAGRAM OF A FIBROID GROWING FROM THE POSTERIOR WALL OF THE CERVIX TO SHOW ITS RELATIONSHIP TO THE PERITONEUM.

It is difficult to state the relative proportions which fibroids in the cervix bear to those in the body of the uterus. Our own observations fix the proportion of cervix fibroids at 5 per cent.

This, however, only includes those which exceed a diameter of 5 centimetres.

LATENT FIBROIDS.

If a number of uteri be examined from women between the twenty-fifth and fiftieth years of life by the simple means of sectioning them with a knife, in a large proportion of them a number of small rounded bodies resembling knots in wood will appear, their whiteness being in strong contrast with the redness of the surrounding muscle tissue. These discrete bodies, in many instances no larger than mustard-seed, are fibroids, and are in histologic structure identical with the fully-grown tumours. A uterus may contain ten or more of these small bodies without the least distortion of contour or alteration in its size. These seedling fibroids may never cause trouble, may never pass beyond this stage, and often calcify in old age,

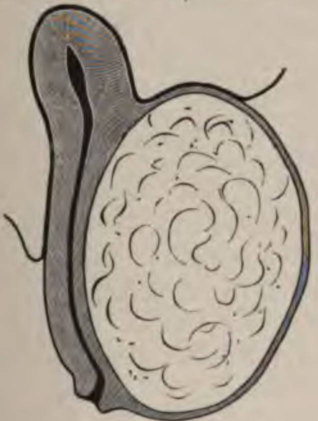


FIG. 59.—DIAGRAM OF A FIBROID GROWING FROM THE ANTERIOR ASPECT OF THE CERVIX TO SHOW ITS RELATIONSHIP TO THE PERITONEUM AS IT PASSES FROM THE ANTERIOR WALL OF THE UTERUS TO THE BLADDER.

but they may at any time grow and become formidable tumours.

A careful consideration of the great frequency of seedling fibroids, and their multiplicity when compared with the number of fibroids which attain a size sufficient to render them clinically appreciable, makes it undeniable that a large proportion of them remain latent. They may be compared to latent buds in trees (knots) and plants, on the ground that they may remain quiescent a number of years, and then assume active growth without any known cause.

Latent fibroids have an important practical bearing; it is not an uncommon experience for an operator to dilate the uterine canal and abstract two or more submucous fibroids. However carefully the procedure may be conducted, and no matter the thoroughness with which the walls of the cavity are examined for minute fibroids, no honest assurance can be given to the patient that other fibroids will not grow.

The Structure and Secondary Changes of Fibroids.—Uterine fibroids differ much in texture; some are as hard as cartilage, others as soft and succulent as an orange; between these extremes every degree of hardness or softness occurs. Hard tumours are yellowish-white on section; soft specimens approach the normal colour of the uterus. As a rule, soft fibroids grow rapidly and are very vascular; the softest tumours are those which have undergone secondary changes (myxomatous degeneration). It is by no means uncommon to find a uterus beset with fibroids, some of which are very hard; one or more may be calcified, others are as soft as the uterine wall, whilst one or more may be diffluent in the centre, and perhaps the biggest one among them is necrotic or even gangrenous. Indeed, the only structural feature that such fibroids have in common is a well-marked capsule of fibrous tissue, which completely isolates the tumour from the surrounding uterine tissue. Even in completely calcified fibroids a thin capsule can be demonstrated, and occasionally the only solid representative of a fibroid is the capsule.

The minute structure of a fibroid is best studied in small, moderately soft specimens or in the seedling tumours (Fig. 60).

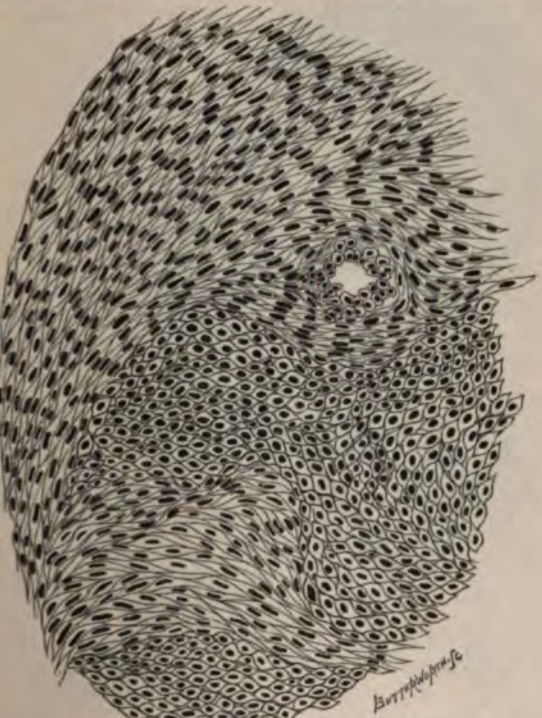


FIG. 60.—THE MINUTE STRUCTURE OF A UTERINE FIBROID.

The circular cells are spindles cut at right angles. The figure represents a complete section through the equator of a seedling fibroid the size of a mustard-seed.

Concerning the cause of fibroids, we are in absolute ignorance, and it is strange that they should arise so frequently in the uterus, yet be so rare in other hollow muscles, such as the bladder, œsophagus, stomach, intestine, and heart. A closer study of the facts only leaves us to wonder why they should be so common in the body and neck of the uterus, whilst they are almost unknown in the Fallopian tubes. But, strangest of all, these tumours are almost peculiar to women (and though so common in white races are even more frequent in the black women of North America), for very few cases have been

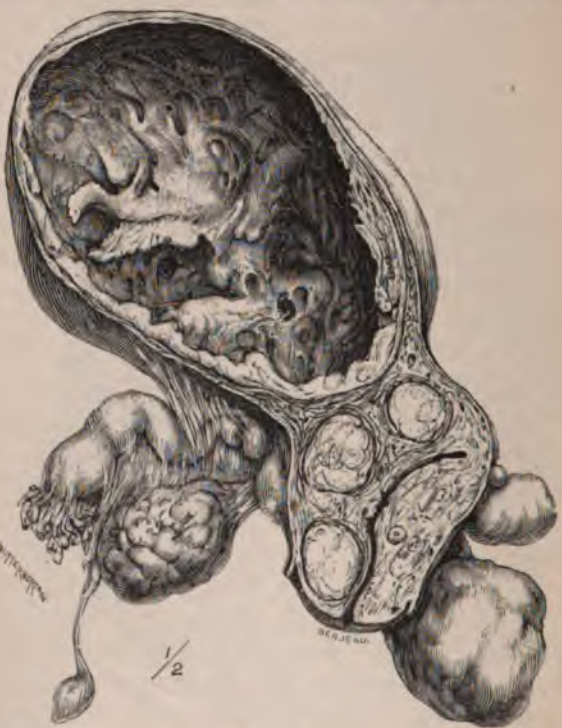


FIG. 61.—A SESSILE SUBSEROUS UTERINE FIBROID WHICH HAS UNDERGONE EXTENSIVE MUCOID DEGENERATION.

From a sterile married woman thirty-seven years of age.

described by reliable observers in the uteri of lower mammals, either domesticated or wild.

Although much careful investigation has been devoted to the minute structure of fibroids, no satisfactory explanation has been advanced to explain their origin. The seedling tumours bear such close relations to the walls of arteries as to lead more than one investigator to regard the muscle tissue of the uterine arterioles as the source of fibroids. *Young fibroids have much the same relation to the terminal branches of the uterine arteries that neuromata bear to the epineurium of nerves* (Bland-Sutton).

Recklinghausen's observations that some fibroids arise in remnants of the Gartnerian and Wolffian ducts have not been confirmed by competent British pathologists.

Secondary Changes in Fibroids.—The chief are: mucoid degeneration; fatty metamorphosis; calcification and septic infection.

Mucoid Degeneration.—Large fibroids are especially prone to soften, whereby large tracts of tissue are converted into mucin, and the tumour often resembles a cyst. The actual conversion of the tumour substance is preceded by œdema of the connective tissue, and the cells assume the spider-like shape of myxomatous tissue; then it becomes as structureless as vitreous humour. Fibroids liquefied in this way are often referred to as fibrocysts. Pregnancy exerts some influence in causing fibroids to degenerate in this manner (Fig. 62; see also *red degeneration*, p. 221).

It is a significant fact that jelly-like fibroids are most frequent in young women, and in some of these cases it is quite open to question whether this is a degenerate change. It is also important that some of these myxomatous fibroids recur after enucleation, and are thus locally malignant, a clinical fact which serves to link fibroids with the less malignant varieties of spindle-celled sarcomata.

Fatty Metamorphosis.—This change is rarer than the preceding. A localized collection of fat has been found in the centre of a pedunculated submucous fibroid.

Calcification.—Old uterine fibroids, large and small, are liable to become infiltrated with lime-salts. The deposit does not take place in an irregular manner in the tissues of the tumour, but corresponds to the disposition of its fibres. On examining the sawn surface of a completely calcified fibroid,

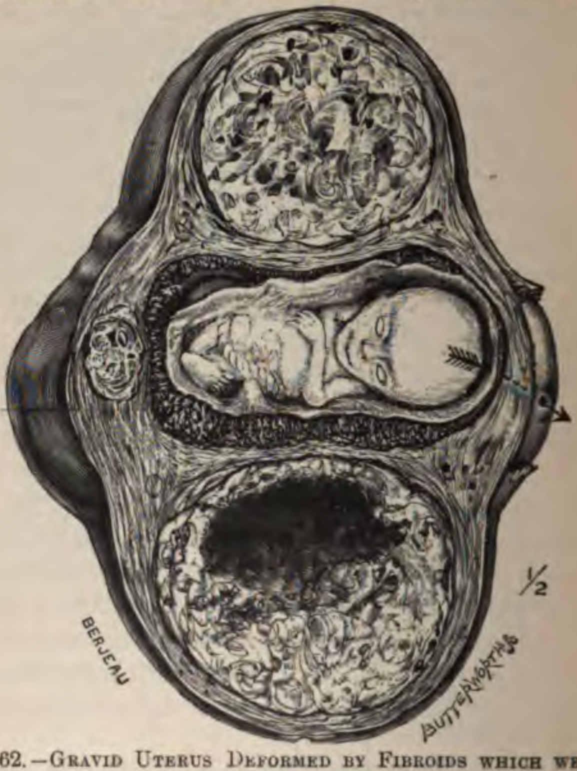


FIG. 62.—GRAVID UTERUS DEFORMED BY FIBROIDS WHICH WERE SOFT, RED, AND ONE WAS DIFFLUENT.

Removed from a woman twenty-eight years of age. The arrow lies in the cervical canal (*vide Lancet*, 1902, vol. i., p. 17).

the whorled arrangement of the fibres is so completely reproduced as to leave no doubt as to the nature of the mass. When these calcified tumours are macerated and the decayed tissues washed away, the calcareous matter remains as a coherent skeleton of the tumour. Such changes have actually taken place whilst the tumour remained in the living uterus; they were formerly termed "uterine calculi," and when found in coffins in old burying-grounds are sometimes imagined to be very large vesical calculi.

A subserous fibroid is very prone to calcify, and, if its stalk be thin, is apt to be twisted, and the tumour, becoming detached, falls into the cœlom and finds its way into all sorts of queer recesses. A detached nodule of this sort may tumble into a hernial sac.

Malignancy.—It is currently believed that a sarcomatous change may supervene in uterine fibroids. The matter has been considered very carefully by competent writers. A critical examination of the evidence makes it clear that a very large proportion of cases, described as "sarcomatous degeneration of a fibroid," were examples of infected fibroids. In all future records, if they are published as evidence in this direction, they will need to be sustained by the report of a microscopic examination conducted by a competent pathologist.

The great defect in the history of nearly all the cases of so-called sarcomatous degeneration of uterine fibroids is the absence of the complete history of the cases; sarcomata are so prone to give rise to secondary deposits that any case which had run its natural course to a fatal issue would be expected to yield secondary nodules in the lung at least. Nothing would be more convincing to those who are sceptic.

In relation with this question, it is necessary to mention that the term fibroid is of generic value only. Many tumours are truly myomata, others with equal truth merit the name of fibromyomata. There is also the soft, jelly-like uterine tumour met with most commonly in the interval from the twenty-fifth to the thirty-fifth year, associated with profuse metrorrhagia, profound anæmia (toxic), which on section after removal resembles a mass of trembling jelly (myxoma); this tumour, so often described as a degenerate fibroid, is not so in fact; it is a primary condition, and serves to bridge the interval between the true fibromyoma and sarcoma of the uterus. Many tumours described as fibroids, which had undergone malignant change, were in all probability sarcomata from the beginning.

CHAPTER XXIII

DISEASES OF THE UTERUS—(*Continued*)

THE MODES IN WHICH FIBROIDS IMPERIL LIFE.

It is too true that fibroids are the commonest of all the species of tumours to which women, whether married, single, fruitful or barren, are liable. It is also a fact that the uterus may contain one fibroid or many, and cause neither inconvenience nor suffering; indeed, the individual owning them is ignorant of the existence of a tumour in her womb; but it is equally true that they are often the source of much suffering, and occasionally cause death in insidious ways. The inconveniences and perils which are associated with many fibroids depend very largely on their environment; indeed, there is no organ in which the baleful effects of environment of innocent tumours can be studied in so many aspects as in the uterus.

Hæmorrhage.—This is the commonest of all the inconveniences which fibroids cause, but it is confined to those which implicate the endometrium. The bleeding occurs under two conditions; most commonly it takes the form of excessive loss at the normal menstrual periods (menorrhagia). The most serious hæmorrhages are associated with septic fibroids. It is a fact of some importance that a small submucous fibroid will induce such profuse bleedings at the menstrual period as to place life in imminent peril, whilst a large interstitial tumour, even though it project into the uterine cavity, may scarcely influence the loss.

When a woman with a fibroid bleeds excessively between, as well as at, the normal menstrual periods, it often indicates that the tumour has become septic, and this explains the almost continuous bleeding associated with a partially extruded and gangrenous fibroid (polypus).

Septic Infection.—This is, perhaps, the most serious complication of a fibroid; and, even when it does not cause death, is always attended with dangerous consequences. Infection may arise in a variety of ways—*e.g.*, the extrusion of a submucous tumour into the vagina exposes it to injury, and micro-organisms gain access to the tumour through abrasions in its capsule. Infection may be due to injury from the uterine sound or dirty dilators, or septic changes supervening on labour or miscarriage; occasionally it is due to intestinal gases when bowel adheres to the tumour. An infected fibroid is a soft, dark-coloured, stinking mass, which bleeds freely when touched. In the early stages of the infection it appears on section œdematous, and exhales a sickly odour. On microscopic examination, the muscle cells are separated by multitudes of inflammatory cells, and colonies of pathogenic micro-organisms can by special methods be demonstrated among the inflammatory cells.

When a large fibroid becomes septic it gives rise to severe constitutional disturbance (septicæmia), like gangrene of other organs, and will, unless promptly removed, inevitably destroy life.

Small fibroids, when septic, though they give rise to serious trouble, do not so urgently threaten life, but they work great mischief, for the infection extends from the tumour to the adjacent endometrium, and in due course involves the tubal mucous membrane, which in mild cases ultimately leads to occlusion of the cœlomic (abdominal) ostium of one or both tubes—an event which is occasionally followed by pyosalpinx. In very acute (fulminating) cases the septic material infects the peritoneum, often fatally. Occluded, distended, and pus-containing tubes are not infrequent concomitants of a small troublesome submucous fibroid.

Pyosalpinx, as a complication of uterine fibroids, has not received the full attention it deserves. We have met with it in several cases, in which there was reason to believe that the pain and suffering which induced the patients to seek relief and submit to operation were caused by the occluded and distended Fallopian tubes. It is possible that the occlusion of the cœlomic ostia of the tubes is, in a few instances, responsible for the barrenness of the patients.

Retroflexion of the Uterus.—When a fibroid occupies the posterior wall of the uterus it may produce retroflexion of the organ, and cause the cavity of the uterus to lie at nearly a right angle with the cervical canal. When the uterus is distorted and displaced in this manner, the fibroid in the posterior wall will slowly grow and occupy all the available space in the true pelvis, and become so firmly impacted that it will often require a considerable effort on the part of the operator to extract it in the course of an abdominal hysterectomy.

Impaction.—A fibroid is said to be impacted (or incarcerated) when it fits the true pelvis so tightly that the tumour cannot rise upwards into the belly (Fig. 63). All varieties of fibroids may become impacted, and as the complication is of great clinical importance, it needs detailed consideration.

A solitary intramural fibroid may be small enough to rest in the true pelvis without pressing unduly on the urethra or ureters. Presently, it increases to such a point that the turgescence which precedes the menstrual flow will cause it to press the urethra against the symphysis, and cause retention of urine. When menstruation occurs the turgidity of the tumour subsides, and the urethra is set free. Frequent recurrence of this pressure permanently damages the bladder and kidneys. Very vascular fibroids yield a loud murmur or hum on auscultation, a sign of very great value in differential diagnosis. In many cases it is possible to demonstrate the existence of a loud murmur for a few days before menstruation, but it disappears with the flow of blood, and remains in abeyance until a few days before the succeeding period. When pregnancy complicates a fibroid, impaction is a frequent consequence (see Chapter XXIV.).

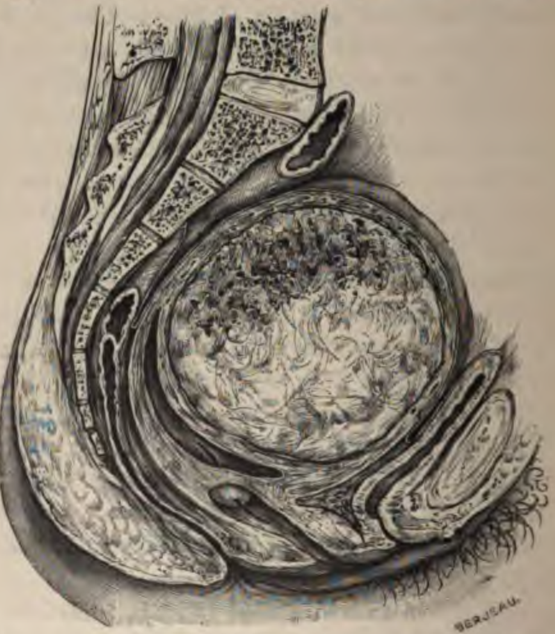


FIG. 63.—SAGITTAL SECTION OF A PELVIS WITH THE UTERUS IN POSITION, SHOWING AN IMPACTED FIBROID.

From a woman who died after oöphorectomy: there were septic changes in the tumour.

The most insidious and therefore the most dangerous variety of impaction is that complicating cervical fibroids. It has already been mentioned that when a cervix fibroid attains an average transverse diameter of 10 centimetres (4 inches) it has practically used up the spare pelvic space, and necessarily exerts injurious pressure on rectum or bladder. Most commonly it presses on the neck of the bladder and causes retention, leading to frequent and painful micturition, causing the patient to seek advice; and this leads to the detection of the tumour. It is one of the most striking features of the cervical fibroids that they do not cause bleeding except when they extrude from the mouth of the uterus and become infected, and rarely cause inconvenience until they interfere with the bladder. Herein lies the danger, as grave injury is often wrought on the pelvis of one or both kidneys before the existence of the tumour is even so much as suspected. It is an important fact to remember that *when a woman between thirty-five and forty-five seeks relief because she suffers from retention of urine for a few days preceding each menstrual period, it is almost a certainty that she has a fibroid in her uterus.*

It sometimes happens that a fibroid—large enough to rest above the pelvis without causing distress—may at the menopause shrink, and gradually fall into the true pelvis and become impacted. This is a dangerous and insidious variety of impaction, but happily of rare occurrence.

Axial Rotation.—A subserous fibroid with a long and slender stalk is liable to rotate and twist its pedicle, a movement which causes very great pain. Some small calcified pedunculated nodules may be so twisted that they become detached.

Although it is unusual to meet with subserous fibroids possessing stalks so slender as to render axial rotation a factor of clinical importance, it is nevertheless an event to bear in mind in estimating the value of pain in diagnosis.

We have met with a curious form of impaction resulting from rotation. When a fibroid grows in the anterior wall of the uterus and another in the posterior wall, so long as the antero-posterior diameter of the uterus with its tumours does not exceed 10 centimetres, it will occupy a normal position. Should the tumours continue to grow, the uterus slowly rotates and the larger tumour will occupy the transverse diameter of the pelvis. If it still grows, it gradually fills up the available space, and impaction slowly but surely follows.

Intestinal Obstruction.—Uterine fibroids may obstruct the intestines in three ways, thus :

A pedunculated subserous fibroid, especially if its stalk be long and narrow, may entangle a loop of small intestine and lead to fatal obstruction. This may happen with small as well as with large tumours.

A very large fibroid rising high in the abdomen may rest upon the pelvic brim in such a way as to obstruct the sigmoid flexure.

Lastly, an impacted tumour may press upon the rectum and lead to obstinate constipation and chronic obstruction, with all its inconveniences and evils.

In a very exceptional case, recorded by James M. Arnott, in 1840, a maiden lady seventy-two years of age was knocked down by a large dog, and fell forward on the pavement. She was seized with severe pain in the belly, and died in thirty-four hours. At the autopsy a circular hole was found in the ileum, which lay between the anterior abdominal wall and a calcified uterine fibroid as large as a child's head. The calcified tumour is preserved in the museum of the Middlesex Hospital.

CHAPTER XXIV

DISEASES OF THE UTERUS—(*Continued*)

FIBROIDS IN RELATION TO MENSTRUATION, PREGNANCY, PUERPERY, AND THE MENOPAUSE.

THE perils are many which beset a patient when, with her uterus occupied by a fibroid, she is unfortunate enough to conceive. This is a matter of deep importance, and as a preliminary it will be necessary to briefly review the relationship of menstruation and uterine fibroids.

There is nothing in oncology better established than the fact that *all uterine fibroids arise during the menstrual period of life.*

In Great Britain menstrual life covers an average of thirty years, from the fifteenth to the forty-fifth year. There are few reliable records of fibroids between the fifteenth and twentieth years. Submucous fibroids have been removed from girls aged eighteen years (Scharlieb and Madden); they cause severe menorrhagia and metrorrhagia. Many examples have been observed between the twentieth and twenty-fifth years. Between the twenty-fifth and thirtieth years they are common, but the maximum of frequency is attained between the thirtieth and fiftieth years.

The interval between the twenty-fifth and thirty-fifth years of a woman's life may be regarded as the great child-bearing period, with an average length of twelve years (Matthews Duncan).

The menstrual epoch of a woman's life may be divided into three periods in relation to pregnancy and fibroids, thus:

1. From fifteen to twenty-five, in which, assuming the environment to be favourable, a woman is infinitely more liable to conceive than to grow a fibroid in the uterus.

2. From twenty-five to thirty-five; during this period her liability to pregnancy is greater than in the preceding period, but her liability to fibroids is also greater (Fig. 64).

3. From thirty-five to forty-five; in this the liability to conception is greatly diminished, but that to fibroids is immensely increased.

Fibroids and Pregnancy.—Assuming that the interval from twenty-five to thirty-five is the great child-bearing period of a woman's life, it follows as a corollary to the three deductions in the preceding section that when pregnancy and fibroids coexist the subjects of such a combination should be women past thirty, and these should, as a rule, be those who have either married late in life, or, if married early, remained many years sterile. The two facts may be stated with a fair amount of accuracy thus:

1. When the uterus of a parous woman begins to grow a fibroid she usually ceases to conceive.

2. When a woman whose uterus contains a fibroid conceives, this event is usually preceded by a long period of unfruitful wedlock.

An exception must be made of the solitary subserous fibroid, especially when pedunculated.

When a woman with fibroids in the uterus conceives, it is certain that her life is in jeopardy, not only so long as the fœtus remains within it, but also when it is expelled, whether this occur prematurely or at the full time. The presence of the tumour not only leads to impaction (Fig. 65), but tends to produce abortion; when this occurs the mother may die from hæmorrhage; if she recovers, the fibroid may disappear as the uterus involutes, but it is a phenomenon of excessive rarity. A submucous fibroid may become septic and slough. A subserous fibroid may become œdematous, and when the uterus empties itself the tumour may inflame and lead to peritonitis

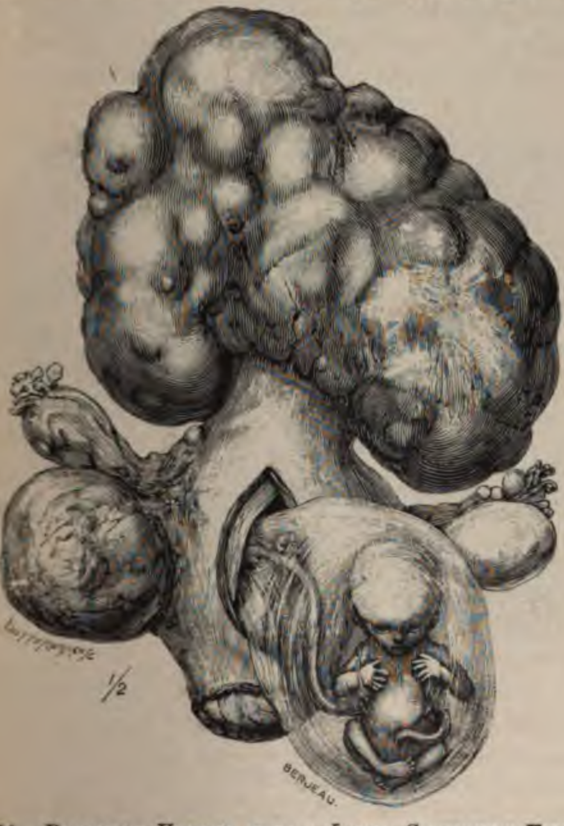


FIG. 64.—PREGNANT UTERUS WITH A LARGE SUBSEROUS FIBROID.

Removed from a woman thirty-one years of age. After the operation and before the uterus lost its tissue-life the anterior wall was cut away; in a few minutes, as the organ contracted, the fœtus and its membranes were extruded through the breach.

or the formation of dangerous adhesions. An impacted fibroid offers mechanical obstruction to the transit of the fœtus; a submucous fibroid may be driven out in front of the presenting part; more frequently it is extruded subsequent to the delivery of the child. The complete extrusion of a fibroid in this way usually requires from four to six weeks; the peril to life is so great that many women who fall into such straits die unless the aid of surgery be enlisted.

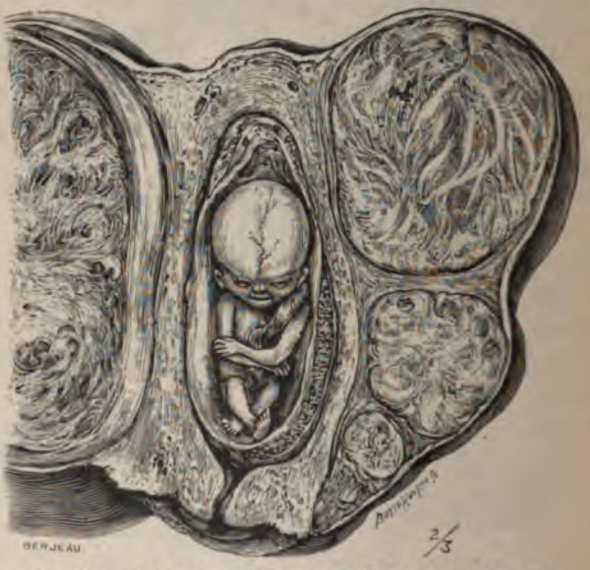


FIG. 65.—A GRAVID UTERUS IN SAGITTAL SECTION.

The pregnancy is complicated with fibroids. At the beginning of the third month impaction occurred; this was relieved, and as the uterus with its tumours was too long to lie in its natural position, axial rotation occurred. The antero-posterior length of the distorted organ was 20 centimetres. Only a portion of the large tumour is shown in the figure.

Pregnancy not only exerts a quickening influence on fibroids, but it is prone to induce a peculiar alteration in colour, and set up a degenerate change. The common colour of a fibroid is dirty white or very pale yellow; in many degenerating fibroids the yellow deepens. In pregnancy the fibroid usually assumes a deep red or a mahogany tint. In the early stages the tumour exhibits this colour in streaks, but as the pregnancy advances the whole tumour becomes affected; in many the tissue softens and forms a spurious cyst. This change, often referred to as "red degeneration," although very commonly associated with pregnancy, is by no means peculiar to it.

The gravity of the association of fibroids and pregnancy depends largely on the situation of the tumour. The submucous variety is the most, and the stalked subserous kinds the least, dangerous. Ovarian tumours have given more trouble to pregnant and parturient women than fibroids; but fibroids have been far more lethal, as they so frequently destroy puerperal women from sepsis (see *Lancet*, 1901, vol. i., p. 452).

When a woman has a tumour suspected to be a fibroid, and there is reason to believe that it is rapidly increasing, it is worth while to remember:

1. *That she may have conceived, and the enlargement is due to the progress of the pregnancy.*
2. *The tumour may have become septic, or secondary changes may have led to the formation of cyst-like spaces.*
3. *The diagnosis may be erroneous, and the suspected fibroid is an ovarian tumour.*
4. *Ovarian tumours and uterine fibroids often co-exist.*
5. *Hydrosalpinx, pyosalpinx, and even tubal pregnancy sometimes complicate fibroids.*
6. *An over-distended bladder has many times been mistaken for a rapidly-growing pelvic tumour.*

Even this list does not exhaust the possibilities, for a *myomatous uterus may become impacted in consequence of conception, and when the impaction is relieved axial rotation may occur, and necessitate surgical intervention* (Fig. 65).

Fibroids and the Menopause.—It was formerly taught and believed that uterine fibroids cease to be troublesome with the cessation of menstruation. It is quite certain that this opinion requires reconsideration. Uterine fibroids stand alone among tumours in the peculiarity of their age distribution, for, as has already been mentioned, they only arise during menstrual life (fifteen to forty-five), but they stand absolutely alone among tumours in possessing another remarkable character: as a rule, they cease to grow after the menopause, and in some instances they undergo a marked diminution in size. Some writers are of opinion that they may disappear. This must be a very exceptional phenomenon, hard to prove, and very difficult to believe.

Though fibroids, as a rule, cease to grow after the menopause, it must not be forgotten that they *sometimes take on unusually rapid growth at this period*; and, apart from this, they are often sources of great peril to life, not only by co-existing with other serious diseases of the uterus, tubes, and ovaries, but the very fact that they are apt to diminish in size is occasionally a source of danger. Apart, however, from these considerations, the fibroids are themselves sources of trouble on account of the degenerate and septic changes to which they are liable. It is also very essential to bear in mind that the existence of a fibroid in the uterus has in a very large proportion of cases a malicious influence in delaying the menopause. The uterus has often been removed from patients between the fiftieth and sixtieth years in whom monthly fluxes of blood were as regular, but much more profuse, than in women of twenty years.

The fact that a fibroid may shrink after the menopause is in itself frequently a source of danger, especially when pedunculated, for the tumour may be so big that its size prevents it from tumbling into the pelvis; but after the shrinking consequent on the menopause such a fibroid may fall into the true pelvis and become impacted. It is a rare complication, but it happens.

The most frequent and dangerous alterations in fibroids after the menopause are necrotic and septic changes. During menstrual life fibroids generally enjoy an abundant blood-supply, and in some instances they are almost as vascular as nævi. On the occurrence of the menopause, the cessation of the menstruation is accompanied by a remarkable abatement in the blood-supply, and the tumour not only ceases to grow, or even shrinks, but the very fact that its nutritive irrigation, so to speak, is arrested leads to degenerative changes, and the fibroid becomes in many instances a dead, sequestered body, and so long as septic organisms are denied access it will remain inert. When from various causes putrefactive organisms gain access to these essentially dead tumours, the results are often dire in the extreme.

It is far easier to prove that putrefactive organisms obtain access to dead or dying fibroids than to tell how they get to them. There is, however, one mode of access which is undeniable. The fibroids which give rise to most trouble after the menopause are those of the submucous variety, and there seems a strong tendency, when the uterus passes into its resting stage and the fibroid is shrinking and dying, for the organ to attempt the extrusion of the tumour. A careful study of the cases which have come under our observation teaches us that a fair proportion of troublesome post-menopause fibroids have undergone partial extrusion, or the mouth of the womb is widely dilated and facilitates the ingress of germs.

It has already been pointed out that one of the greatest perils which can happen to a woman with a fibroid in her uterus is to become pregnant, but after the forty-fifth year she is beset with a danger of quite another kind—namely, cancer of the corporeal endometrium. This subject, however, is dealt with in Chapter XXVIII.

CHAPTER XXV

DISEASES OF THE UTERUS—*(Continued)*

THE CLINICAL CHARACTERS, DIAGNOSIS, AND TREATMENT OF FIBROIDS.

Clinical Characters.—Uterine fibroids, the commonest genus of innocent tumours to which women are liable, are unknown before puberty (see p. 217), and rarely attract attention until the twenty-fifth year; from this age they increase in frequency, and are most common between the thirtieth and fiftieth years. The subjoined table of 100 consecutive cases in which an operation was performed, and the nature of the tumours clearly established, shows the age distribution:

20-24	1
25-29	4
30-39	42
40-49	44
50-60	9
	100

Of this number thirty-six were single women and sixty-four married; of the latter seventeen were mothers; one of them had a family of eight children.

Symptoms.—In a very large proportion of cases the earliest indication of a fibroid in the uterus is excessive menstruation (menorrhagia), and this may be complicated by uterine bleeding between the menstrual periods (metrorrhagia).

These hæmorrhages are often the only symptom which leads the patient to seek advice, and on examination a large pelvic tumour may be detected. In many cases there is no obvious enlargement of the uterus, and the existence of a small submucous fibroid (polypus) is a matter of presumption founded on clinical experience, only proved or disproved by dilating the cervical canal and exploring the cavity of the uterus. In many cases when the patient seeks advice the tumour is actually presenting at the mouth of the uterus.

When the fibroid is so large as to rise out of the pelvis it usually occupies the hypogastric region, but if pedunculated it may lie in the flanks and simulate an ovarian tumour. To palpation it may be smooth, but when the surface is tuberose it is a valuable sign. Auscultation sometimes furnishes useful evidence, for a soft, rapidly-growing fibroid often yields a loud venous hum synchronous with the pulse and indistinguishable from the uterine murmur heard in pregnancy. This murmur may be present a few days before the onset of menstruation, and disappear as soon as the flow occurs, to reappear immediately before the next menstrual period.

On vaginal examination, the tumour will be found closely associated with the uterus. The body and cervix may form part of a globular mass, the mouth of the womb being indicated by a small dimple.

The sound often gives great assistance; in the majority of cases fibroids lead to enlargement of the cavity of the uterus. The sound facilitates localization of the tumour, and often enables the surgeon to determine whether the uterus is involved partially or entirely.

The employment of the sound demands extreme care, for fibroids and pregnancy often co-exist. When free bleeding follows very gentle use of this instrument, it is often an indication that there is a submucous tumour projecting into the uterine cavity.

The chief conditions which complicate the diagnosis of large uterine fibroids are pregnancy and ovarian tumours; the latter are fully discussed in Chapter XXIV.

In some cases the detection of these tumours is simple and certain; in others the wisest and most experienced find great difficulties in the way of exact diagnosis.

It is important to remember that in ordinary circumstances fibroids are painless tumours, hence it may be taken as an axiom that *when a fibroid becomes painful it signifies that the tumour is undergoing secondary changes, or that some complication has arisen in the pelvis* (see p. 221).

Differential Diagnosis of Pregnancy and Fibroids.—Tumours of the internal genital organs of women are most frequent during the sexual period of life—from the fifteenth to the forty-fifth year; and, as many genera of tumours (so far as rate of growth and size are concerned) simulate pregnancy, and *vice versa*, it naturally behoves every surgeon to make himself familiar with the signs, not only of normal gestation, but of the abnormal forms as well. It is also important to remember that his professional reputation may be wrecked, and a single woman's social position may be ruined by such a blunder as attributing the enlargement of her belly to a gravid uterus when it is due to an ovarian or a uterine tumour.

It will be convenient to discuss the diagnosis of pregnancy under the following headings: Normal Pregnancy; Hydramnion; Retroversion of the Gravid Uterus; Cornual Pregnancy (see Chapter XXXIV.); Extra-uterine Pregnancy (see Chapter XXXV.).

I. **Normal Pregnancy.**—In the case of a married woman at the child-bearing period of life, under usual circumstances there is little danger of error; but a married woman with a rapidly growing uterine or ovarian tumour may imagine herself pregnant, and even arrange for the advent of the baby, and have the nurse ready to receive it.

The following constitute a group of signs of pregnancy, which, if carefully sought for, rarely mislead:

1. Amenorrhœa.
2. Morning sickness.
3. Fulness of the breasts, with the presence of milk.
4. Pigmentation of the mammary areolæ.
5. The soft tumour in the hypogastrium, which hardens and softens under firm continued pressure of the palm.
6. Movement of the fœtus.
7. Ballottement.
8. Softness of the cervix.
9. The fœtal heart and the uterine hum.

The cases which give rise to difficulty are those in which individuals have motives for concealing their pregnancy, or cases in which there is some abnormal condition of the fœtus or its membranes, or tumour in addition to pregnancy. In the first set of cases it is easy to recall instances in illustration of "the pertinacity and apparent innocence" with which unmarried women will sometimes deny the possibility of pregnancy even when they are actually in labour.

In cases of unmarried women the greatest caution is necessary before expressing an opinion that the case is one of pregnancy; by a little waiting the case settles itself, and in doubtful conditions nothing is to be gained by giving an opinion straight away, whereas two months is, as a rule, sufficient to lead the patient to thoroughly realize her condition, and she may not, in the circumstances, deem it necessary to trouble the surgeon a second time.

Two rules should be observed in dealing with cases of suspected pregnancy: (1) When in doubt, defer expressing an opinion, and see the patient again after a few weeks' interval.

(2) *Never pass a sound where there is even a suspicion of pregnancy.*

II. **Hydramnion.**—This complication of pregnancy has many times been mistaken for a large, rapidly growing ovarian cyst. The trouble consists in the accumulation of an excessive quantity of amniotic fluid. Usually the gestation proceeds normally till near the seventh month; then the belly increases in size in a rapid manner, and causes great inconvenience and distress. Clinically the enlargement furnishes the signs of a very large ovarian cyst.

Should there be any difficulty in the diagnosis as between hydramnion and a pelvic tumour, the employment of the uterine sound will settle the difficulty. It will probably terminate the pregnancy, but this is preferable to an abdominal section made under the supposition that the patient has a tumour. The amount of fluid present in cases of hydramnion is sometimes almost incredible, and may amount to many litres. Hydramnion is usually associated with twins. Ballottement is, as a rule, not only easily obtained, but unusually distinct.

III. **Retroversion of the Gravid Uterus.**—This means that the fundus of the uterus is lodged in the hollow of the sacrum, and is prevented from rising on account of the sacral promontory. As the uterus enlarges, the cervix is raised and pushed forward, compresses the urethra, and causes retention, often accompanied by incontinence (ischuria paradoxica). The clinical signs of a gravid uterus in this condition are very decided. First, there is the presence of an oval hypogastric tumour (the overfull bladder); the signs and symptoms of pregnancy between the third and fourth months; and on examination a rounded elastic swelling (the body of the uterus) occupying the hollow of the sacrum will be felt, whilst the cervix lies behind the pubes, and sometimes so high that the finger can hardly reach it. On passing a catheter, and emptying the bladder, the hypogastric tumour disappears. On examining the abdomen bimanually, the fundus of the uterus cannot be detected anteriorly. These facts serve to distinguish an incarcerated uterus from a uterine fibroid, tubal pregnancy, or ovarian tumour. The diagnosis is usually verified by rectifying the position of the uterus. After emptying the bladder, upward pressure on the uterus through the vagina or the rectum will cause it to ascend. Sometimes it will be necessary to administer an anæsthetic in order to effect the replacement.

There is a condition of the pregnant uterus in primiparæ which is occasionally a source of uncertainty in diagnosis, especially in the early months. The patient complains of pelvic pain, and on examination a globular body is felt which strongly resembles an ovarian cyst or a softened fibroid. The cervix retains its virgin shape and hardness, and a deep sulcus can be made out by the finger between it and the globular body. When this condition occurs in an unmarried woman who asserts that menstruation is normal, doubts arise, and if the practitioner is incautious and passes the sound, it will be arrested at the top of the lengthened cervix, and give the impression that the uterus is of normal length, and, as it will not lead to abortion, brings about an erroneous judgment. In patients who are married and admit the arrested menstruation, the condition is apt to be mistaken for extra-uterine gestation. In doubtful cases a little deliberate waiting and watching will clear up matters.

Treatment.—All attempts to cure uterine fibroids by medical and electrical methods have been conspicuous failures, so that patients whose lives are threatened by these tumours are obliged to seek the aid of surgery.

It is true that fibroids often occupy the uterus for years and cause no trouble, but many give rise to menorrhagia and metrorrhagia so severe as to place life in great jeopardy.

Indeed, recurrent hæmorrhage is the most common condition which leads women with fibroids to seek medical aid. Pelvic pain, due to pressure of the tumour on urethra, bladder, or bowel, is common, and is of course inimical to health directly and indirectly. Inflammation (infection) and gangrene are dangerous conditions. Fibroids complicated with tubal and ovarian diseases and with pregnancy demand careful attention.

The chief indications for surgical interference may be enumerated thus :

Severe recurrent hæmorrhage ; pain ; rapid increase in size ; impaction ; intestinal obstruction ; gangrene ; necrosis ; the co-existence of tubal and ovarian disease.

Bleeding in many cases can be temporarily controlled by rest, the administration of styptics—*e.g.*, ergot, hamamelis, hydrastin, etc.—and by rest and tamponades.

It is a noteworthy fact that those who have made a careful and prolonged study of tumours from the pathological as well as the clinical aspect are unanimously of opinion that the most effectual method of treatment is *thorough removal of the tumour whenever this is practicable at the earliest possible moment.* In the case of uterine fibroids the observance of this canon has only become practicable during the last five years. With the aid of anæsthetics, asepsis has revolutionized the surgery of the uterus.

The indications for surgical treatment may be summarized thus :

1. Stalked tumours protruding at the mouth of the womb are readily detached by seizing the tumour with a volsella and twisting it off ; or the pedicle may be divided with scissors—*vaginal myomectomy*.

2. Often the presence of a submucous fibroid is conjectural ; then the cervical canal is dilated and the interior of the uterus explored with the finger. Small fibroids thus discovered are

easily removed. Large sessile fibroids require more deliberate treatment—*vaginal enucleation.*

3. Fibroids with a greater diameter than 5 to 6 centimetres often require hysterectomy, and as this is a serious matter operative treatment is frequently postponed.

The following indications may serve as guides in advising hysterectomy:

(1) A fibroid (too large to be removed by the vagina) which is the cause of serious and repeated bleeding, producing profound anæmia, the bleeding being uninfluenced by rest and the administration of drugs.

(2) A fibroid of moderate size in a woman between thirty and forty-five becoming impacted and causing retention of urine at each menstrual period.

(3) A fibroid rapidly increasing in size and extending high above the pelvic brim and pressing on the colon, so as to cause intestinal obstruction.

(4) A fibroid rapidly enlarging after the menopause.

(5) A fibro-cystic tumour.

(6) A fibroid that has given little trouble suddenly begins to enlarge rapidly, accompanied by rapid pulse, high temperature, and signs of septicæmia. These signs indicate septic infection of the tumour; it should be removed without delay. Occasionally a gangrenous fibroid is too large to be removed through the vagina, and requires abdominal hysterectomy.

(7) The large pedunculated fibroids which simulate ovarian tumours may be easily dealt with by transfixion and ligature of their pedicles (abdominal myomectomy). When sessile and of moderate size, subserous fibromyomata may be shelled out of their capsules, the edges of which then are carefully sutured (abdominal enucleation). Many interstitial fibroids may be successfully treated by enucleation. A submucous tumour, too large to be removed by the vagina, may be removed by hysterotomy.

Fibroids complicating Pregnancy.—The dangers which may occur with such a combination are : (1) Abortion; (2) mechanical impediment to delivery; (3) free bleeding on abortion or delivery at term; (4) a submucous fibroid may become infected and slough; (5) septic peritonitis.

The stages when some of the above troubles may arise and the appropriate treatment for each may be indicated thus:

1. *During Pregnancy.*—It may be necessary to induce labour, but the best authorities prefer to enucleate the tumour, or to perform abdominal hysterectomy.

2. *The Difficulty declares itself during Labour.*—It may then demand hysterectomy.

3. *Complications during Puerpery.*—These may require myomectomy or abdominal hysterectomy.

Operations for Fibroids.—These are discussed in Chapter LV.

CHAPTER XXVI

DISEASES OF THE UTERUS—(*Continued*)

SARCOMA OF THE UTERUS.

THE uterus, like other organs containing unstriped muscle tissue, is occasionally the seat of sarcomata, both of the round-celled and spindle-celled species; but, unlike other hollow muscular organs, it has a thick and richly cellular lining—the endometrium—which theoretically would predispose it to become attacked by sarcomatous disease.

The uterus is liable to sarcomata of two varieties, which are distinct in structure as well as in topography. For example, sarcomata may arise in the body of the uterus or in its neck.

Sarcomata of the Body of the Uterus.—This variety may be of the round or spindle celled species, and arises as a discrete tumour in the endometrium. It would be correct to speak of such tumours as sarcomatous fibroids. Sarcomata, especially of the spindle-celled species, arise in the connective tissue of the broad ligament, and quickly implicate the uterus, so that it is impossible to be sure on physical examination whether the tumour is of uterine origin or not. Even in the course of an operation sarcomata arising in the wall of the uterus so simulate in their smooth contour the naked-eye features of a benign fibroid that the most experienced surgeons have been deceived. Occasionally, on exposing the uterus in the course of an operation, its surface will present here and there small soft 'buds,' or sessile prominences, which means that the growth is eroding its investments. This at once indicates to the surgeon the malignant nature of the tumour, although it may be circumscribed like a benign fibroid. This is one of the most dangerous features of sarcomata in the body of the uterus, for clinically they resemble the common forms of fibroids that in many instances the uterus has been removed, under the impression that the patient had a rapidly-growing fibroid, and in the course of a few months she returns with recurrence in her pelvis, and, as a rule, quickly dies from the effects of the disease.

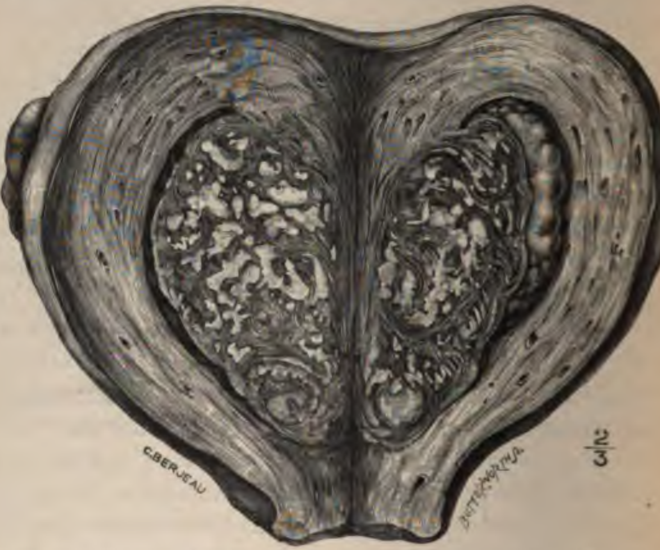


FIG. 66.—UTERUS OPENED BY A VERTICAL INCISION IN ITS POSTERIOR WALL.

The endometrium is occupied by an unencapsuled mass of caseous tuberculous tissue. The uterus was removed by the abdominal route, under the impression that it contained a degenerated submucous fibroid, from a spinster aged 46 years. Recovery was uneventful.

It is facts of this kind which make us reiterate the statement made in Chapter XXII. that many of the cases described as fibroids undergoing malignant change, the tumours were in all probability malignant in their beginning.

Diagnosis.—It is rarely possible to distinguish in the early stages between a benign fibroid and a sarcomatous fibroid of the body of the uterus, and in the late stages it is very difficult to distinguish between a sarcoma, a carcinoma, or primary tuberculosis of the corporeal endometrium (Fig. 66), or a septic fibroid.

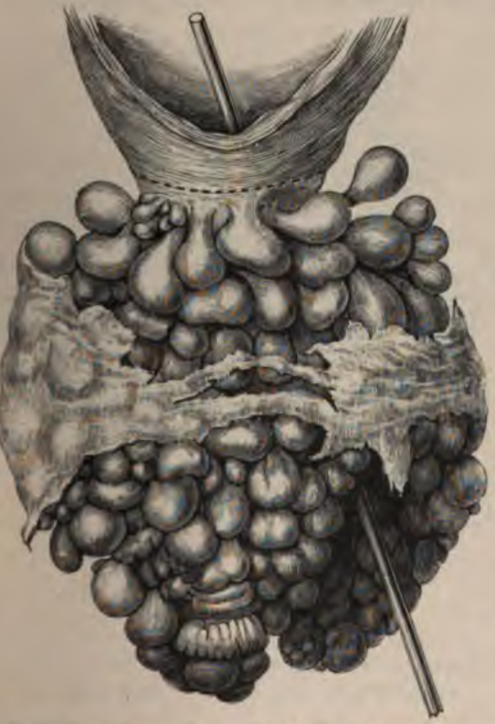


FIG. 67.—RACEMOSE (GRAPE-LIKE) SARCOMA OF THE NECK OF THE UTERUS (PERNICE).

Racemose (Grape-like) Sarcoma of the Neck of the Uterus.—This is a rare but distinctive form of sarcoma of the uterus which has been observed in girls and young nulliparous women. It arises in the cervical endometrium, and in its typic form hangs in the vagina like a bunch of grapes or a cluster of bodies resembling the hydatidiform mole (chorion-epithelioma benignum, p. 256).

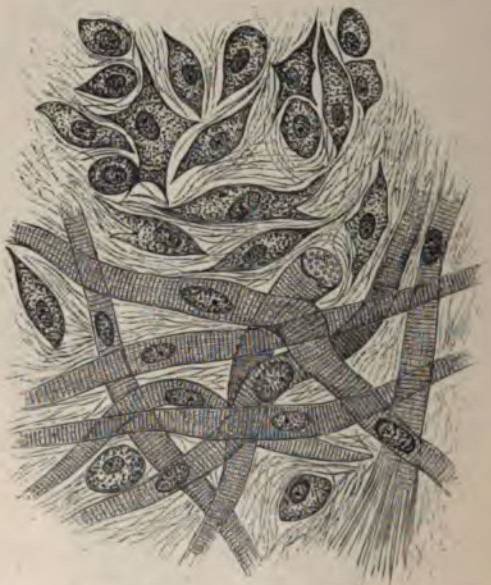


FIG. 68.—MICROSCOPIC FEATURES OF A SPINDLE-CELLED RACEMOSE SARCOMA OF THE NECK OF THE UTERUS.

Some of the spindles have a cross striation (Pernice).

In structure racemose sarcomata are made up of spindle cells, and the grape-like bodies consist of oat-shaped cells, the grape being covered with columnar epithelium. In the specimen described by Pernice (Fig. 67) gland-like spaces ined with cubical epithelium existed in the basal parts of the tumour. These were derived from the glands in the cervical endometrium. This tumour was also peculiar in possessing spindle cells with a cross striation indistinguishable from that of striped (voluntary) muscle. The tumour was removed, but it quickly recurred, infiltrated the uterus, and quickly destroyed the patient. On microscopic examination the recurrent mass exhibited the usual features of a spindle-celled sarcoma.

Treatment.—The only method which affords any hope for patients with uterine sarcoma of any kind is hysterectomy, but the results are not very encouraging. The removal of the uterus is invariably followed by rapid recurrence. Hysterectomy for a racemose sarcoma has been performed on an infant a year old, but not with success (Curtis).

CHAPTER XXVII

DISEASES OF THE UTERUS—*(Continued)*

CANCER OF THE UTERUS.

Cancer in the strictest pathologic sense is a disease of epithelium, and its minute structure is modified by the character of the epithelium in which it arises. This is well illustrated in the case of the uterus. Cancer arising on the vaginal aspect of the cervix is of the squamous-cell species, and that which arises in the endometrium of the cervical canal or the cavity of the uterus is of the columnar-cell species.

Cancer (Carcinoma) of the Neck of the Uterus.

This part of the uterus is liable to two kinds of cancer, the squamous-cell species (sometimes called epithelioma), which arises on the vaginal aspect of the cervix, and the columnar-cell species, arising in the epithelium of the cervical canal.

Squamous-celled Cancer.—This disease arises in the cap of stratified epithelium which covers the vaginal aspect of the neck of the uterus (Fig. 69), and is directly continuous with the epithelial investment of the vagina, and ends abruptly at the margin of the external orifice of the uterus.

Cancer may arise on any part of this area of stratified epithelium, but it begins most frequently near the extremity of the cervix. It appears as an ulcer with thick hard margins deeply eroding the cervix, or it may appear as a raised, hard, irregular, warty mass.

Microscopically, the structure of the growth is the same as in other regions of the body, and consists of epithelial cones invading the underlying tissues. The disease gradually extends from the cervix to the vaginal wall and involves the connective tissue of the mesometria, the rectum and bladder. The ultimate results are the same as those due to cancer of the cervical endometrium. When the disease is well advanced it is impossible to decide on clinical grounds whether it arose from the vaginal surface of the cervix or from the endometrium of the cervical canal.

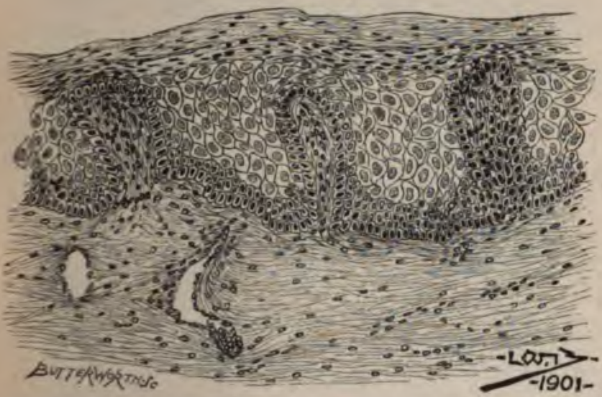


FIG. 69.—THE MICROSCOPIC CHARACTERS OF THE EPITHELIUM COVERING THE VAGINAL ASPECT OF THE NECK OF THE UTERUS.

Columnar-celled Cancer.—The endometrium of the cervical canal is lined with columnar epithelium and beset with racemose glands. The columnar epithelium and the distribution of the glands end below at the external orifice (os) of the uterus; above, the epithelium of the canal is directly continuous with that lining the cavity of the uterus. The epithelial cells of the cervical endometrium and its glands are narrower than those of the endometrium proper (Fig. 70).

Microscopically, cancer of the cervical endometrium consists of spaces filled with columnar epithelium (Fig. 71). This depends on the fact that the invasion of the tissues is due to columns of epithelium; in the sections these columns are cut at right angles.

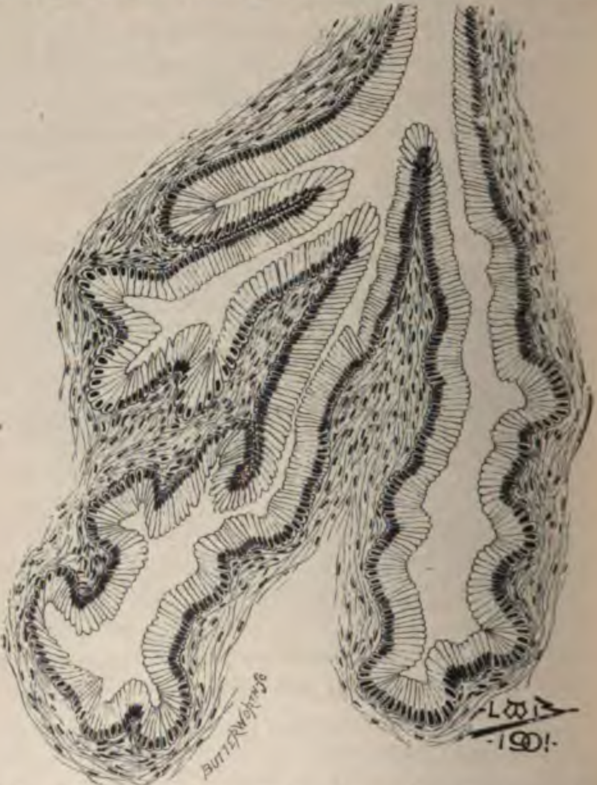


FIG. 70.—THE MICROSCOPIC CHARACTERS OF A GLAND FROM THE CERVICAL ENDOMETRIUM.

Cancer arises in the epithelium in any part of the cervical canal, but it appears to be more liable to attack the lower than the upper half of the canal. It begins either as a deeply eroding ulcer or as a fungating cauliflower-like outgrowth. For a time it remains restricted to the cervix (Fig. 72), and after infiltrating adjacent tissues spreads into the mesometrium and implicates the vaginal wall; it destroys the cervix and involves the body of the uterus, and in the last stages of the disease this organ becomes eroded until nothing but a thin shell remains. When the uterus is hollowed out in this way and its cervical canal is obstructed by the growth, the cavity of the uterus becomes distended with pus; this condition is termed **Pyometra.** The pus sometimes escapes intermittently, or, as it is often described by the patient, "in gushes." Pyometra may occur independently of cancer.

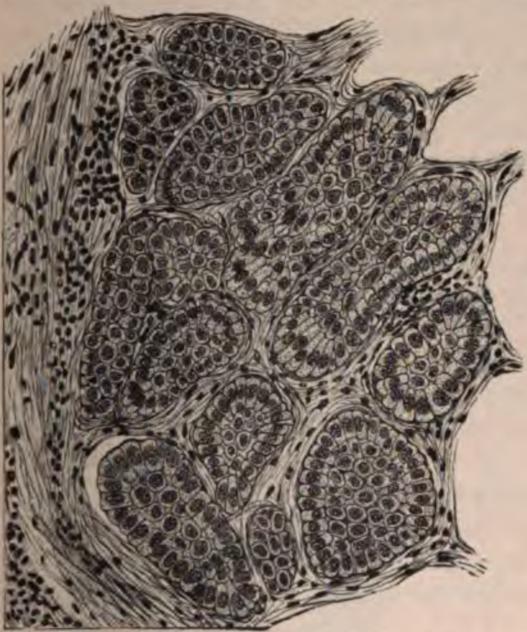


FIG. 71.—MICROSCOPIC CHARACTERS OF CANCER OF THE CERVIX.

The lymph glands in the course of the iliac vessels are soon infected, and finally those of the lumbar set.

Dissemination is frequent; secondary deposits occur in the lungs and liver, and they are sometimes met with in the bones, but not with the same frequency as in mammary cancer.

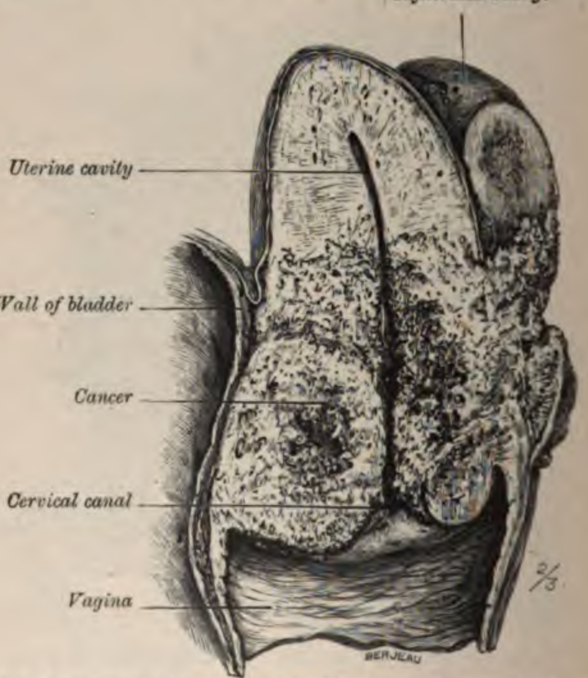


FIG. 72.—UTERUS IN SAGITTAL SECTION WITH ADVANCED CARCINOMA OF THE CERVIX.

Although in writings and clinical work sharp distinctions are made between cancer arising in the cervix, and cancer originating in the "body of the uterus," yet cases occasionally come under observation where it would be difficult to state with certainty whether the disease began in the lower part of the body of the uterus or in the upper part of its neck, and this uncertainty is not dispelled by a microscopic examination of the parts.

Symptoms.—Cancer of the neck of the uterus is very common between the age of thirty and sixty. It occurs as early as the twenty-third year, but it is unusual before the thirtieth year of life. *It is almost exclusively confined to women who have been pregnant*, and it is not easy to determine whether this predisposition depends on injury to the cervix during delivery, or traumatism associated with coitus.

The signs of cancer are bleeding, offensive vaginal discharge and sometimes pain. The first two are the signs which usually lead women to seek advice.

On examination, if the disease is in an early stage, the margins of the cervix are everted and a fungous mass protrudes from the canal and bleeds on the slightest touch. In some cases the conditions are such as to preclude a positive diagnosis, but bleeding on gentle examination is always a suspicious sign, and especially when the patient complains that coitus is followed by bleeding. In cases of doubt an accurate diagnosis is of the greatest importance for the welfare of the patient, and a portion of the suspected tissue should be removed and submitted to microscopic examination. Conditions likely to be mistaken are adenomatous disease of the cervix or a sloughing cervical fibroid.

In the late stages, when the cervix is destroyed and an ulcerating cancerous mass replaces it, there is no difficulty in recognising its nature.

A fatal termination is induced in a variety of ways:

1. The ulceration may open the uterine artery and cause fatal hæmorrhage.
2. Repeated bleedings lead to exhaustion and death.
3. Implication of the bladder and one or both ureters (Fig. 73) causes cystitis, septic pyelitis, and uræmia.
4. Septic changes in the uterus extend to the Fallopian tubes

and cause pyosalpinx; or pus may leak through an unoccluded ostium and set up septic peritonitis.

5. Peritonitis may be due to rupture or perforation of a pus-containing Fallopian tube.

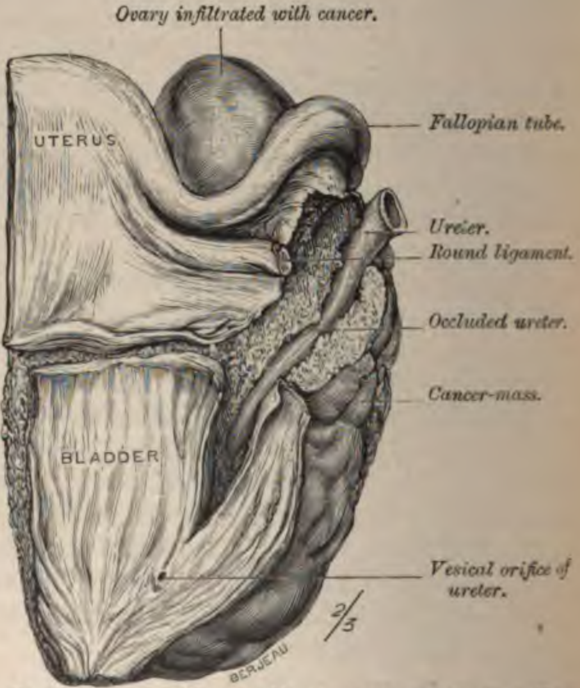


FIG. 73.—CANCER OF THE CERVIX UTERI IMPLICATING THE URETER AND BLADDER.

6. Intestinal obstruction may follow adhesion of small or large intestine to the uterus, or direct extension of the growth to the rectum.

7. Hydroperitoneum and hydrothorax may be due to secondary nodules of cancer on the peritoneum and pleura.

8. Secondary deposits in the brain are rare, but they occasionally induce fatal coma and sometimes acute mania.

Treatment.—The only treatment available for cancer of the neck of the uterus is that adopted for cancer in other parts of the body, namely, thorough removal at the earliest possible moment; but, unfortunately, it is only practicable to carry this out in a very small proportion of patients. The first object in a radical operation for the relief of cancer in any part of the body is a wide removal of the infected part, and this is prevented in the case of the cervix by the proximity of the bladder, ureters, and rectum. When the patient comes early under observation, and especially when the cancer is limited to the cervical canal, the performance of vaginal hysterectomy is followed by satisfactory consequences immediate and remote; but when the disease has overrun the cervix and implicates the vaginal wall it is impossible to make a free removal of infected tissue without imperilling the integrity of the bladder and ureters, and thus anticipating some of the most distressing effects of the disease. Quite apart from the limitations which the anatomical environment imposes on surgical efforts in the treatment of this disease, there is, unfortunately, the insidious character of the disease itself, and only a small percentage of patients seek advice when there is an opportunity of doing good by surgery. In recent years the mortality of vaginal hysterectomy for cancer of the cervix has reached the low point of 5 per cent., but the frequency and rapidity of recurrence has discouraged many surgeons. Now that the profession is awakening to the necessity of early diagnosis in this dreadful disease, and at the same time realizing that the only hopeful cases are those where the operation is undertaken in the early stages, and that surgeons abstain from operating except in the promising cases, so will the results improve, and patients will be encouraged to seek surgical aid at the very outset.

Palliative Treatment.—In the majority of cases where no radical operation is possible much may be done to make the patient's life not only tolerable, but even comfortable. In a very large proportion of cases the patients are able to keep about, look after their homes, and lead useful lives, often for many months, until renal complications and anæmia, the joint result of repeated bleeding and purulent discharge, so weaken them that they are compelled to keep in bed. At this stage careful nursing renders them fairly comfortable; the patients should be kept scrupulously clean by daily douches of warm water tinged with permanganate of potash. When the discharge is offensive a daily douche of perchloride of mercury (1 in 5,000) will rarely fail to correct it. Pain may be alleviated by the judicious use of morphia administered subcutaneously. The constipating effects of this drug are best met by variations in diet, accompanied by ripe fruit and vegetables, aided by occasional enemata consisting of two to four drachms of turpentine, an ounce of castor-oil, some soft-soap, and a pint of warm water.

In cases unsuitable for operation life is rarely prolonged beyond a year and a half. Many die within a few months from the time they come under observation.

It has been suggested in cases of inoperable cancer of the cervix to remove the ovaries with the hope of effecting a cure, but observations have been reported where cancer has attacked the cervix many years after the ovaries have been removed to cause a fibroid to shrink (Blacker).

Cancer of the Neck of the Uterus and Pregnancy.

It may be stated without fear of contradiction that the most appalling complication of pregnancy is cancer of the cervix. It is somewhat difficult to understand how a woman with cancer of the neck of the uterus can conceive, but it is quite certain that it happens even when the disease is well established. Careful perusal of periodical gynæcological literature shows that this complication is not uncommon, but that the cases in which cancer of the neck of the uterus obstructs labour are unusual, and this is due to two circumstances: (1) That cancer predisposes to abortion; and (2) that when it has advanced to such a stage as to fill the vagina with an obstructive mass, it has had such an effect upon the health of the mother that it endangers the life of the fœtus. This is a matter of some importance, because in considering the advisability of performing Cæsarean section in these circumstances it is necessary to be certain that the fœtus is really alive. However, in very exceptional cases it has been found absolutely necessary to resort to this operation in order to deliver a dead and putrid fœtus.

The careful study of the literature relating to this complication shows clearly enough that when a pregnant woman with early cancer of the uterus comes under observation in the early months of pregnancy her best hope lies in vaginal hysterectomy. In the later stages (fourth to seventh months) very good consequences have followed the amputation of the cervix, and this operation has been carried out very successfully and without disturbing the pregnancy. In the latest stages the best consequences have followed the induction of labour and the immediate performance of vaginal hysterectomy; for, surprising as it may seem, the uterus, though enlarged from the pregnancy, can be safely extirpated through the vagina.

These methods of treatment only apply to cases where the cancer is in such a condition as to afford reasonable hope of a prolongation of life. When the disease is in an inoperable stage and the fœtus is dead, then after a little patient waiting abortion usually occurs. When there is reliable evidence that the fœtus is alive, then the pregnancy should be allowed to go to term; if the cancer affords an impassable barrier to the transit of the child, then Cæsarean section becomes a necessity.

CHAPTER XXVIII

DISEASES OF THE UTERUS—(*Continued*)

CANCER OF THE BODY OF THE UTER

Two forms of cancer arise in the endometrium, and differ f each other in some remarkable clinical and histolog features. The endometrium is lined with columnar epit lium directly continuous with the epithelial investment of Fallopian tubes above, and the cells covering the cerv

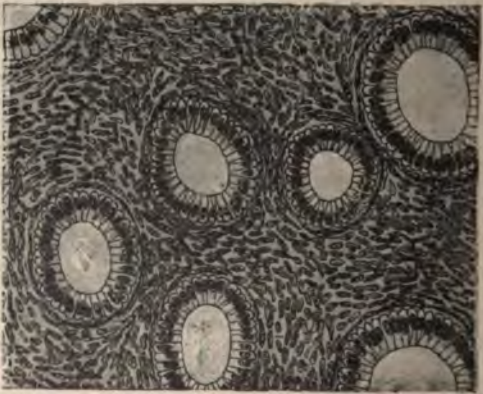


FIG. 74.—THE TUBULAR GLANDS OF THE UTERUS IN TRANSVER SECTION.

endometrium below. The glands are very characteristic, a consist of tubules lined with a single layer of columnar epith lium, and are striking objects in microscopic sections of t endometrium (Fig. 74).

The common form of cancer of the body of the uterus resembles in its naked eye and minute characters cancer of the cervix, with the exception that the cells are like those lining the cavity of the uterus. Of its early stages little is known, because the disease is even more hidden from observation than cancer of the cervix.

When the cancer is well advanced the uterus is filled with soft, delicate masses of tissue which bleed on the slightest touch. This explains the name by which this disease used to be known, namely, villous endometritis.

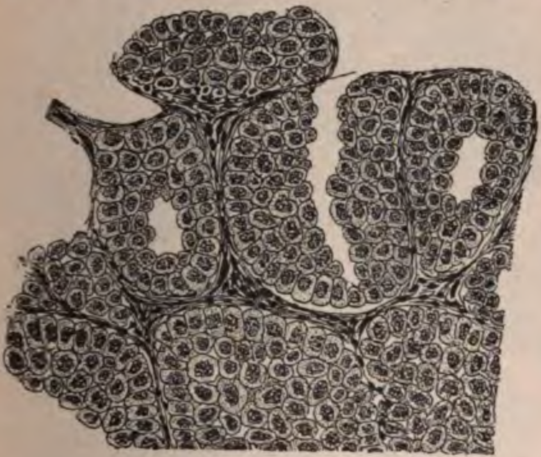


FIG. 75.—MICROSCOPIC CHARACTERS OF THE COMMON KIND OF CANCER OF THE BODY OF THE UTERUS.

For a time the cancer remains restricted to the body of the uterus, and may creep into the uterine sections of one or both Fallopian tubes; it only invades the cervix in the late stages. Buds of the cancer may perforate the wall of the uterus and infect the peritoneum.

Symptoms.—Cancer of the body of the uterus is rare before the forty-fifth year; it is most frequent at, or subsequent to the menopause. Most cases occur between the fiftieth and seventieth years; *the majority of the patients are nulliparæ.*

The signs that usually attract attention are the occurrence of fitful hæmorrhages after the menopause, followed by profuse and offensive discharges, which are often blood-stained. On examination the cervix feels normal, and may appear so when examined with the help of a speculum, but the uterus often feels larger than natural.

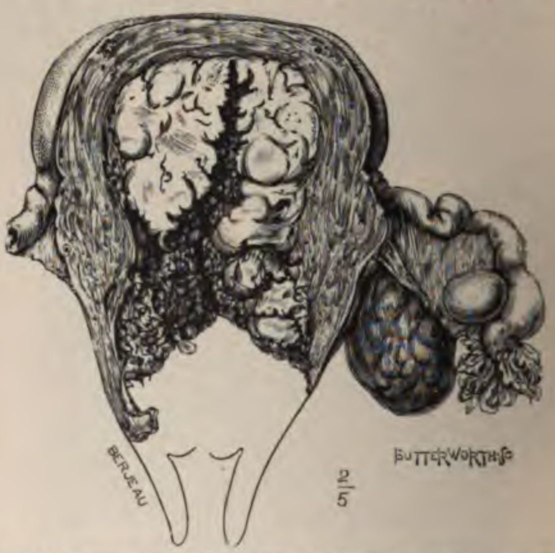


FIG. 76.—A UTERUS WITH "TUBULAR" CANCER SHOWN IN CORONAL SECTION.

The patient was forty-one years of age, and mother of one child.

The disease is very apt to be mistaken for some variety of endometritis, especially for the varieties called senile and villous endometritis; on the other hand, endometritis is frequently regarded as cancer of the body of the uterus.

The *diagnosis* is usually made by dilating the cervical canal and removing a fragment of tissue from the uterine cavity and examining it microscopically (Fig. 75).

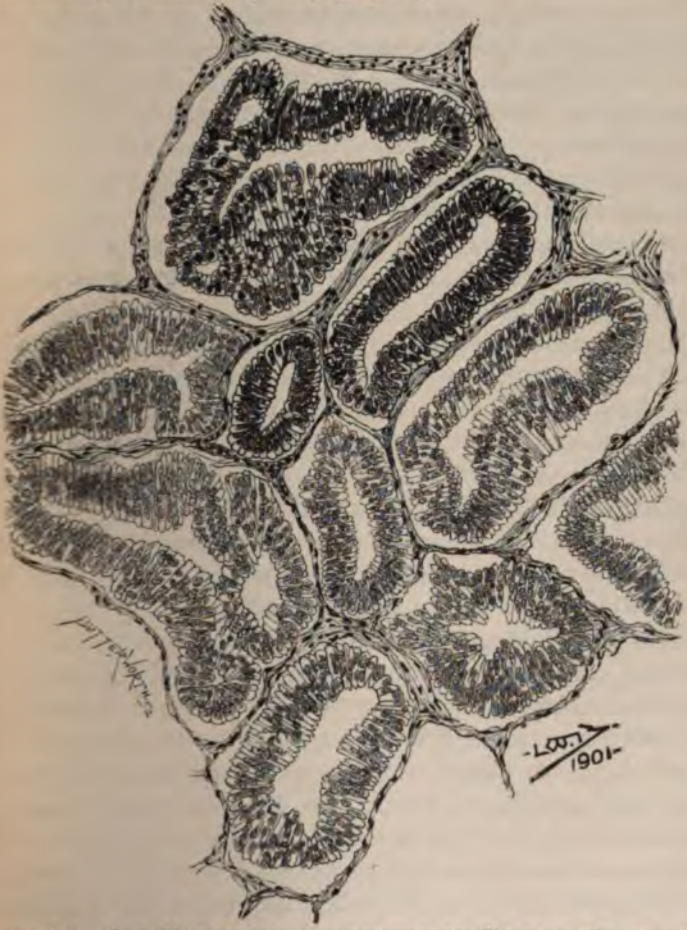


FIG. 77.—THE MICROSCOPIC CHARACTERS OF TUBULAR CANCER OF THE UTERUS. (From the uterus depicted in Fig. 76.)

The rarer variety of cancer of the endometrium when well advanced causes great enlargement of the uterus, and on examination the cavity of this organ will be found beset with a large number of smooth, rounded polypoid processes (Fig. 76).

The microscopic characters are shown in Fig. 77; the striking feature is the preservation of a central lumen in each epithelial cylinder. This has induced one of us to term this rare species, **tubular cancer.** Quite apart from its histologic diversity from the more common form of cancer of the endometrium, it also differs in causing great enlargement of the uterus, and is probably less malignant. This species of cancer also requires careful consideration in relation with the remarkable condition known as "diffuse adenomyoma of the uterus" (see p. 196).

Attention has already been drawn to the fact that cancer may attack the neck of the uterus after complete removal of the ovaries. It is also true that cancer may arise in the endometrium of the body of the uterus after double ovariotomy (Butler-Smythe).

Cancer of the Uterus and Fibroids.—Uterine fibroids are very common, so is cancer of the uterus, and as the maximum of frequency in relation to age is very near in the two diseases, it is not a matter of surprise that the two conditions should frequently co-exist. In some cases the two diseases may be seen in close proximity without interfering with each other, but when the capsule of a fibroid is invaded by contiguous cancer the tumour ulcerates and sloughs with great rapidity. Cancer of the body of the uterus is more frequently complicated with fibroids than cancer of the cervix, and it is a fact important to bear in mind that when a woman who has attained her menopause and is known to have fibroids, and especially if she be sterile, begins to suffer from irregular "issues of blood," these may be due to cancer of the endometrium. These are always suspicious signs, and demand the most careful investigation. The matter may be put in the following aphoristic form: *When a woman with* *uterine fibroids, having passed the menopause, begins to have irregular profuse uterine hæmorrhages, it is extremely probable that she has cancer of the body of the uterus.*

The signs which attract attention are fitful, vaginal hæmorrhages after the menopause, followed by profuse, offensive, and often blood-stained discharges. The uterus on examination may seem scarcely enlarged; sometimes, however, it may be much bigger than usual. In the majority of cases the diagnosis cannot be established with certainty until the cervical canal is dilated, and a fragment of the suspected cancer extracted and submitted to microscopic scrutiny. It often happens that when the cervical canal is dilated in this way the disease may be so advanced that there is no reasonable doubt in regard to the diagnosis, and in such circumstances it is sometimes to the best interest of the patient to complete the treatment by at once removing the cancerous organ. Even should it be decided to await a microscopic examination of the tissue, it is a useful measure to carefully remove with a blunt curette all the exuberant cancerous material, as this checks bleeding and limits decomposition of the necrotic portions of the cancer.

The only successful treatment available for cancer of the body of the uterus is hysterectomy. This operation may be carried out either by the vaginal or the abdominal route. We have carried out a series of operations by both methods, and feel satisfied that though the immediate risks of the operation are the same in both, the remote consequences are much better when the uterus is removed by the abdominal route. It must be remembered that in cases where the growth is very luxuriant the uterus may be very big, and its removal entire through the vagina becomes an impossibility; for it is a matter of the first importance to remove a cancerous uterus entire and without undue handling and squeezing, because the one great danger which women run in the operative treatment of this disease is **cancer-infection.** When the peritoneum is fouled with cancer material, the cells possess so much power of independent growth that large masses of cancer spring up on the pelvic peritoneum in a few weeks, and quickly destroy the patient.

When the uterus is removed by the abdominal route the operator is not only able to completely extirpate the uterus, but he can remove the Fallopian tubes, ovaries, and adjacent segments of the broad liagments. It has also this advantage, that it enables the operator to satisfy himself as to the extent of the disease, and also he can assure himself as to the absence of lymph-gland infection and dissemination.

Should either of these conditions be present, then it would be useless to perform hysterectomy. It is a fortunate matter that the prospects of a patient after hysterectomy for cancer of the body of the uterus are infinitely better than in cancer of the cervix, and a number of cases can be brought together where women have had immunity from recurrence for five and even ten years. The great secret of success is early recognition of the disease and prompt radical treatment.

CHAPTER XXIX

CHORION-EPITHELIOMA (DECIDUOMA)

In 1889 Sänger and Pfeiffer independently described a variety of malignant disease arising in the uterus presenting microscopic characters so strongly resembling decidual tissue that the disease was named **deciduoma malignum.** Subsequent investigations by other observers brought to light the important fact that this remarkable disease is very liable to arise in the endometrium within a few weeks or months of abortion or delivery at term, and especially after the expulsion of the so-called 'hydatid mole.' Moreover, the microscopic investigation of the tumour showed that it conformed in histologic type to the multinuclear mantle or syncytium which covers the chorionic villus. This discovery led to a change of opinion as to the source of the disease, and as most writers regard it as arising from changes in the epithelial elements of the chorionic villi rather than in the decidua, the name **chorion-epithelioma** has come to be adopted in preference to deciduoma.

Before considering the essential features of this disease the change in the chorion known as the hydatid mole needs a brief description.

The normal villi of the chorion in the early stages of their development consist of an axis or core of delicate connective tissue covered with epithelium arranged in two layers. The inner is known as *Langhan's layer*; the outer, called the *syncytium*, is peculiar, and resembles a large elongated multinucleated cell enveloping the villus like a mantle. In the early stages the connective-tissue core of the villus is devoid of bloodvessels. The tissue in the early stages consists of branching cells, separated from each other by mucoid intercellular substance. Later the cells become spindle-shaped, and the tissue denser and vascularized.

In the disease known as 'hydatid mole' the villi become changed into transparent grape-like bodies, and look not unlike the vesicles so characteristic of the cystic stage of *Tænia echinococcus* (hydatids), and a hundred years ago the grape-like or vesicular bodies (Fig. 78) were regarded as hydatids, especially as the embryo is rarely to be found in these specimens.

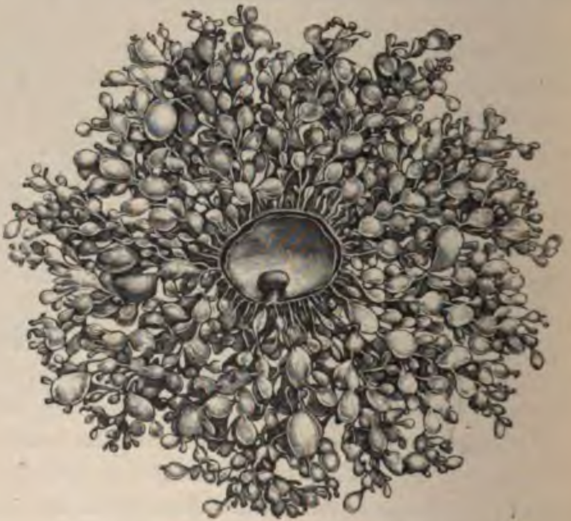


FIG. 78.—HYDATID MOLE (AFTER BUMM).

In 1827 Madame Boivin and Velpeau showed that the disease depended on a change in the chorionic villi. Virchow gave attention to the histology of these vesicle-like bodies, and considered them to be due to a myxomatous change in the villi (1853). This view prevailed until Marchand, in 1895, demonstrated that the essential feature of the change depends more on the epithelium than the stroma of the villus, for it undergoes irregular proliferation, and assumes invasive characters, penetrating the decidua, and even the muscular wall of the uterus. The vessels of the villi disappear, the stroma degenerates, and the swollen condition of the so-called vesicles is the result of œdema rather than mucoid change (Figs. 79, 80). The invasiveness or destructiveness of these altered villi has long been recognised, and specimens have been observed in which the villi have perforated the uterus, and caused fatal bleeding into the abdominal cavity.

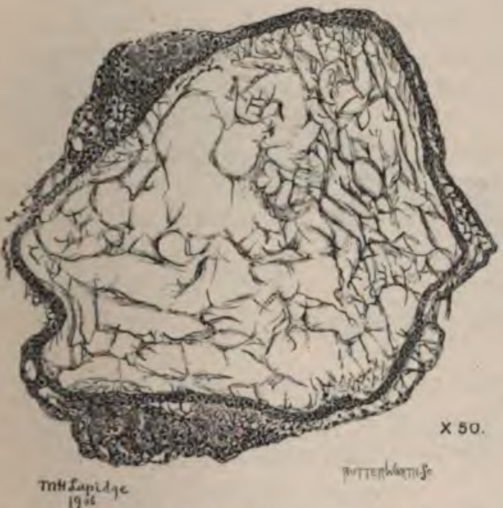


FIG. 79.—MICROSCOPIC APPEARANCE OF A CHORIONIC VILLUS FROM A HYDATID MOLE, IN TRANSVERSE SECTION.

Hydatid mole (or **chorion-epithelioma benignum**) is not common. Its relative frequency has been estimated by one writer (Madame Boivin, 1827) to occur once in 20,000 pregnancies, and by another (Williamson, 1899) once in 2,400. It is quite certain that only a small proportion of women who have expelled hydatid moles suffer from chorion-epithelioma, but no reliable estimates are available. The liability of a woman who has had a miscarriage of this kind to be the victim of such a deadly disease as chorion-epithelioma malignum renders it advisable that she should keep under medical supervision for some months after such an event.

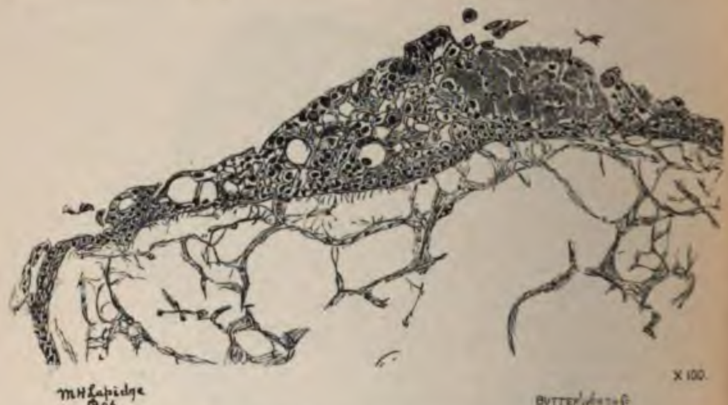


FIG. 80.—A PORTION OF CHORIONIC VILLUS FROM A HYDATID MOLE MORE HIGHLY MAGNIFIED.

Portions of decidua are shown.

Some writers are disposed to believe that there are two varieties of the hydatidiform mole, one being purely innocent, and the other giving rise to the malignant chorion-epithelioma. As yet microscopical inquiries have not provided these theoretical distinctions with a histologic foundation.

The Relation of the Hydatid Mole (Chorion-epithelioma Benignum) to Lutein Cysts.—Some valuable observations have been made on the frequent association of bilateral lutein cysts of the ovary and the so-called hydatid mole. Indeed, the presence of lutein cysts in this disease is constant enough to lead to the belief that the two conditions are correlated. The lutein cysts are large enough to be of clinical importance, and they have been known to obstruct delivery, and in one instance to cause acute symptoms by undergoing axial rotation.

This has given a new interest to the yellow tissue which composes the greater part of a corpus luteum, and some observers state that it furnishes an internal secretion, and that the adhesion of the oösperm to the endometrium depends on a proper supply of lutein secretion.

Fraenkel has elaborated this theory, and his views receive the support of some competent German pathologists. An overproduction of this secretion, the result of a plus quantity of lutein tissue, sets up, according to Pick, a "chorio-epitheliomatous reaction" in the embedded ovum, and leads to the formation of a benign chorion-epithelioma (hydatid mole).

Lockyer has made a careful study of this question, and the result of his painstaking inquiry lends great support to the view that there is a close correlation between lutein cysts and chorion-epithelioma of both kinds.

Chorion-epithelioma Malignum (Deciduoma).—The uterus when attacked by this disease usually enlarges, and often becomes big enough to be appreciable as a tumour in the hypogastrium (Fig. 81). Its contour may be nodular. In some patients the disease is limited to the endometrium, and the primary focus of the disease may be so small as not to cause enlargement of the uterus. Some very exceptional cases have been described in which the disease did not involve the uterus, but began in the vagina.

The intimate dependence of chorion-epithelioma on changes associated with pregnancy is illustrated by the fact that this disease occurs primarily in the Fallopian tube as a sequel of tubal pregnancy.

The result of the examination of a large number of examples of this disease by many investigators has established the fact that it arises in portions of the chorionic villi which remain embedded in the endometrium after the expulsion of the main products of gestation, and especially if the villi have undergone hydatidiform change. This relationship to chorionic epithelium is well shown in Fig. 79.

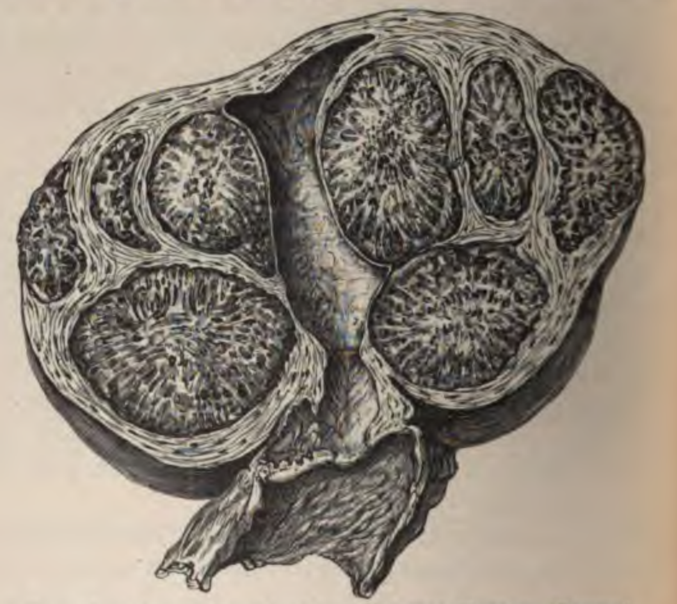


FIG. 81.—DECIDUOMA MALIGNUM OF THE UTERUS (SÄNGER).

Some competent authorities still believe that there may be two varieties of this disease, one arising from the epithelial elements of the chorionic villi and the other in decidual tissue.

To the naked eye the tumour-tissue appears on section as a soft reddish mass. "Histologically, a chorion-epithelioma consists of well-defined cells of various shapes and sizes closely packed together, and large multinuclear irregular masses of protoplasm in which no definite cell masses are recognisable. This tissue invades and destroys the uterine tissues after the manner of a malignant growth. It contains no proper connective-tissue stroma or bloodvessels of its own" (Teacher).

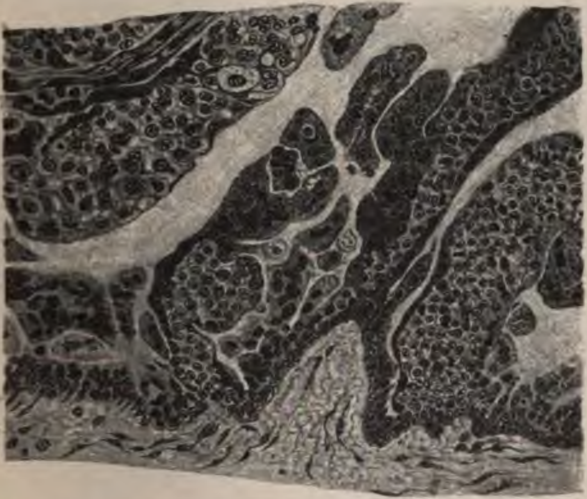


FIG. 82.—PORTION OF A CHORIONIC VILLUS FROM A CHORION-EPITHELIOMA, SHOWING THE ORIGIN OF THE TUMOUR FROM THE EPITHELIUM OF THE VILLI (After John H. Teacher).

A remarkable feature connected with chorion-epithelioma is the discovery that certain intrathoracic teratomata and teratoid tumours of the testis contain tissue indistinguishable from that of chorion-epithelioma.

The eroding power of the cells of a chorion-epithelioma enable them to penetrate the tissues and gain entrance to veins. Fragments are deported by the blood-stream, to lodge in lungs, bones, and other viscera, and grow into secondary deposits. The common situations for these deposits are the lungs and vaginal veins.

The course of the disease is marked by oft-recurring profuse bleeding from the uterus, rigors, pyrexia, great emaciation, and the signs of dissemination, such as secondary nodules in the lungs, bones, and the abdominal viscera. The disease is fatal, and often runs a very rapid course.

The chief clinical signs are frequent bleeding from the uterus, producing great anæmia, accompanied usually by enlargement of the uterus following a recent labour or miscarriage. Many of these signs are caused also by the retention of a fragment of placenta, or a uterine mole. In such circumstances the cervical canal should be dilated, and the cavity of the uterus explored. Any retained fragments of conception that are removed should be submitted to careful microscopic examination, in order to establish a reliable diagnosis.

Treatment.—The most satisfactory method of dealing with this disease is prompt removal of the uterus. Teacher considers it reasonable to conclude that operation offers a fair chance of recovery, and that it may be done with some prospect of success in the face of the gravest signs of disease, and even of metastasis, having occurred.

Literature.—An admirable summary of knowledge relating to lutein cysts and their relation to chorion-epithelioma (hydatid mole) is given by Cuthbert Lockyer (*The Journal of Obstetrics and Gynæcology of the British Empire*, 1905, vol. vii., p. 1).

An admirable summary relating to chorion-epithelioma and a complete catalogue of the literature is furnished by John H. Teacher (*Transactions of the Obstetrical Society*, London, 1903, vol. xlv., 256).

CHAPTER XXX

DISEASES OF THE FALLOPIAN TUBES

In addition to inflammatory affections, the Fallopian tubes are liable to tuberculosis, sarcomata, cancer, and chorion-epithelioma.

Salpingitis (*Inflammation of the Fallopian Tubes*).—This is nearly always secondary to septic infection of the genital tract. The chief causes are septic endometritis following labour or abortion; gangrene of a uterine polypus; gonorrhœa; tuberculosis; and cancer of the uterus. The micro-organisms most frequently associated with infective lesions of the Fallopian tubes are the gonococcus, streptococcus, staphylococcus, pneumococcus, *Bacillus coli communis*, and *Bacillus tuberculosis*. Salpingitis is a very common disease in hospitals, but unusual in private practice. This may be explained by the fact that harlots take less care of their genitals than courtesans; and poor women do not get the same careful obstetric nursing as the wives of the rich.

The changes produced in the tubes by septic endometritis and gonorrhœa are almost identical, and the effects produced may be studied under four headings: (1) The acute stage; (2) the occlusion of the tubal ostium; (3) pyosalpinx; (4) hydrosalpinx.

The Acute Stage.—When the infection extends from the mucous membrane of the uterus to that of the tubes, the tubal tissues become soft, succulent, swollen, and friable. The surface of the mucous membrane is covered with glutinous pus, which exudes from the abdominal ostium when the tube is squeezed. When this infective material escapes from the tubes into the pelvic section of the cœlom it sets up pelvic peritonitis which is not infrequently rapidly fatal; when it supervenes on delivery or abortion it is commonly termed "puerperal peritonitis." The occurrence of infective peritonitis in this way has been demonstrated on many occasions by carefully conducted autopsies. Acute gonorrhœal peritonitis sometimes occurs in the same way, though it is far less frequently fatal than that which follows septic endometritis, ensuing on labour or abortion. The gonococcus is not, as a rule, a general pyogenic organism; it is specific in that the effects it produces are mainly confined to the mucous membrane of the genital organs. In cases where cœliotomy has been necessary in gonorrhœal peritonitis, pus has been seen escaping from the abdominal ostium of the tube, and the gonoccocus has been demonstrated in the pus (Wertheim, Bland-Sutton, and Cushing). Recently Foulerton succeeded in obtaining a pure culture of the *Micrococcus gonorrhœæ* from a case of pelvic peritonitis secondary to gonorrhœal salpingitis.

The direct channels established by the Fallopian tubes between the cavity of the uterus and the cœlom (general peritoneal cavity) facilitate peritoneal infection. But its frequency is diminished in a very important manner by occlusion of the cœlomic ostia of the tubes—a pathological sequence of great value in so far as the saving of life is concerned. Gonococcal peritonitis occurs in children (see p. 275).

Occlusion of the Ostium.—When inflammation extends from the tubal mucous membrane to the peritoneum adjacent to the ostium, it leads to the formation of adhesions in consequence of the organization of the exudation which leads to the matting together of the tubal fimbriæ; this also glues them to the ovary and posterior layer of the broad ligament, and occasionally to a coil of intestine. This mechanically seals the ostium.

There is another interesting and probably slower way in which these ostia become occluded. The fimbriæ are luxuriant protrusions of tubal mucous membrane beyond the ostium. When the tubes are inflamed the muscular and serous coats lengthen and bulge over the fimbriæ until each ostium appears as a rounded smooth orifice instead of being fringed; gradually the rounded margins contract, cohere, and occlude the opening. In the early stages, if the rounded end of the occluded tube be slit up, the fimbriæ will be found crowded inside the tube. This mode of occlusion is termed "salpingitic closure of the ostium" (Fig. 83). In rare instances the inflammatory effusion which exudes from the cœlomic ostium of the tube becomes encapsuled (Fig. 84).

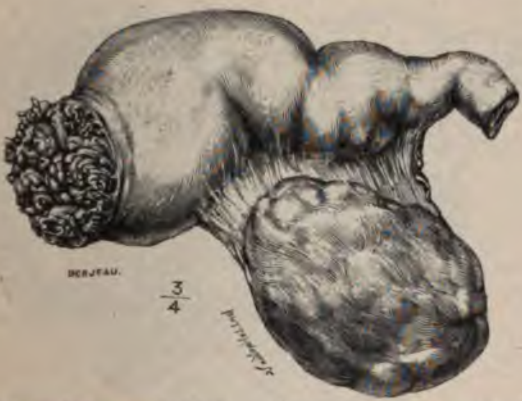


FIG. 83.—THE OVARY, FALLOPIAN TUBE, AND ADJACENT PART OF THE MESOSALPINX FROM A PATIENT IN THE ACUTE STAGE OF GONORRHŒAL SALPINGITIS.

The muscular coat of the tube is in the act of slowly engulfing the fimbriæ.

This sealing up of the ostium is a remarkable and conservative process in so far as the life of the individual is concerned. The occluded tube now becomes the seat of important changes whereby it is converted into a pyosalpinx, a hydrosalpinx, or undergoes sclerosis. Occlusion of the tubal ostia is one cause of sterility in women after septic endometritis. It also explains why strumpets are so often barren.

Pyosalpinx (*sactosalpinx purulenta*).—This may be defined as a Fallopian tube with an occluded cœlomic ostium, the cavity of the tube being distended with pus.

In the early stages a pyosalpinx may not exceed the finger in thickness, but in a fair proportion of cases the tube becomes distended and its walls thicken in some, and thin in other parts, until it assumes the shape and attains the size of a ripe banana. Exceptionally a pyosalpinx forms a swelling large enough to rise above the brim of the pelvis.

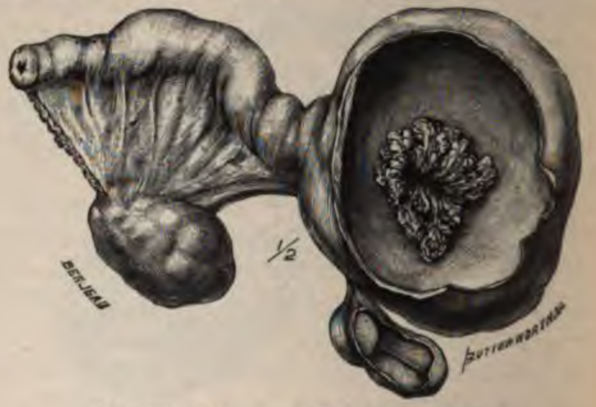


FIG. 84.—FALLOPIAN TUBE AND OVARY.

The cœlomic ostium and fimbriæ are enclosed by a capsule formed around an inflammatory exudation from the tube due to an acute gonorrhœal salpingitis.

A pyosalpinx adheres to adjacent structures, such as the ovary, mesometrium, bowel, and especially the rectum. Sometimes the wall of the sac bursts, and the pus is discharged into the cœlom (general peritoneal cavity) and sets up fatal peritonitis. More frequently a pyosalpinx opens into the rectum and the pus escapes by the anus. This is one method of spontaneous cure.

In severe cases of salpingitis, as has already been mentioned, the ovary is almost always implicated, and while the tube is undergoing conversion into a pyosalpinx an abscess forms in the ovary. The sacculated pus-containing tube and the abscess in the ovary may remain distinct, but very frequently the two fuse together and form what is known as a tubo-ovarian abscess (Fig. 85).

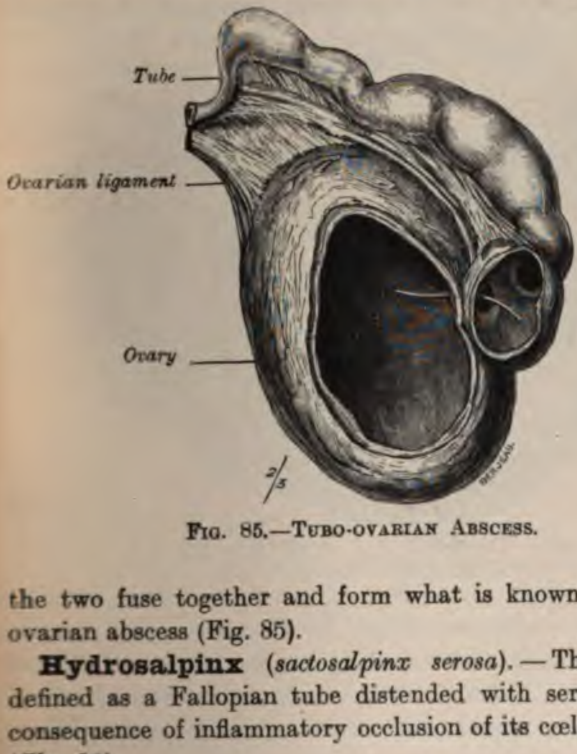


FIG. 85.—TUBO-OVARIAN ABSCESS.

Hydrosalpinx (*sactosalpinx serosa*).—This may be defined as a Fallopian tube distended with serous fluid in consequence of inflammatory occlusion of its cœlomic ostium (Fig. 86).

Salpingitis does not always lead to occlusion of the abdominal ostia of the tubes. A mild attack may conveniently be described as "catarrh of the tubes," and, like a nasal or gastric catarrh, subsides and leaves no trace. When the inflammation has been sufficiently severe to seal the ostium the tube is permanently damaged. Such a tube becomes passively distended with fluid and converted into a legume-shaped cyst. The steps of this change are similar to those which occur in the gall-bladder and kidney, secondary to obstruction of the cystic duct or the ureter. Frequently the ampulla of the tube becomes greatly distended and the tube assumes the shape of a retort; very frequently the part corresponding to the isthmus of the tube becomes elongated and tortuous.

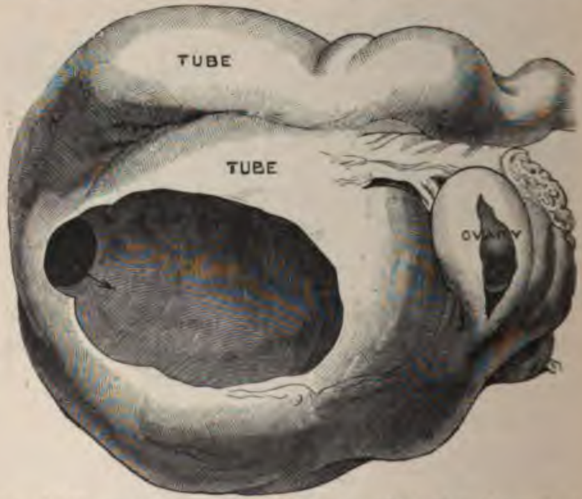


Fig. 86.—A Large Hydrosalpinx. (From Bland-Sutton, "Diseases of the Ovaries and Tubes.")

A hydrosalpinx sometimes possesses walls so thin that it is translucent and devoid of adhesions. In other cases the wall is universally adherent. Many examples of hydrosalpinx are secondary to pyosalpinx, the purulent contents of which have become sterile. The inner walls of such sacs occasionally bear papillomata.

A hydrosalpinx does not often exceed the dimensions of a turkey's egg, but occasionally it will form a swelling appreciable above the brim of the true pelvis ; very large specimens are often erroneously termed tubo-ovarian cysts and ovarian hydroceles.

A hydrosalpinx sometimes undergoes axial rotation, and this leads to symptoms which in many instances have been mistaken for acute inflammation of the vermiform appendix. The premier example of this condition was recorded by Bland-Sutton in 1891. In 1904 Bell was able to collect the records of fifty additional cases (*Trans. Obstet. Soc. London*, vol. xlvi).

Intermitting Hydrosalpinx.—It has been stated on clinical evidence that the fluid in a hydrosalpinx may escape through the uterus, the blockade at the uterine end of the Fallopian tube being raised. Such a condition is termed "hydrops tubæ profluens," the escape of the fluid taking place at irregular intervals. Profuse discharges of pus and fluid occur in connection with pyosalpinx and hydrosalpinx, accompanied by a diminution in the size of the tumour, due to the formation of a fistula between the cyst and the rectum or the vagina. We have never been able to satisfy ourselves that a hydro- or pyo-salpinx discharges itself into the uterus through the uterine orifice of the tube.

It is a fact of some interest that the uterine end of the Fallopian tube is rarely obliterated in salpingitis. Of course the tumidity of the mucous membrane would be sufficient in most cases to obstruct the passage of fluid from the tube into the uterus.

Hæmatosalpinx (*sactosalpinx hæmorrhagica*). — This term is applied to a distended non-gravid Fallopian tube with an occluded cœlomic ostium. The cavity contains blood or blood-stained fluid.

Many museum specimens formerly catalogued as examples of hæmatosalpinx prove on careful examination to be gravid tubes. This matter is discussed in the section devoted to Tubal Pregnancy. *It is necessary to remember that bleeding from the Fallopian tubes occurs from other causes than tubal pregnancy, but mere hæmorrhage from a tube does not constitute hæmatosalpinx.*

Sclerosis of the Tubes.—Every Fallopian tube affected with chronic salpingitis is not converted into a pyosalpinx or a hydrosalpinx: it may become changed into a hard fibrous body traversed by an irregular canal.

In the early stages of salpingitis the tubal walls are infiltrated with inflammatory exudation; gradually this exudation organizes into fibrous tissue, and the true tubal structures atrophy. It is a very slow process, and probably six years are required for the conversion. The process is identical with that which leads to stricture of the male urethra. It is not unusual to find a hydrosalpinx on one side of the uterus and a sclerosed Fallopian tube on the other.

Sclerosed tubes are sometimes sources of danger, as small abscesses form in them, perforate the wall of the tube, and lead to adhesion of small intestine; occasionally this causes fatal intestinal obstruction. Sclerosis of the tubes may be regarded as Nature's method of curing salpingitis.

Tuberculous Salpingitis.—Most examples of this disease are secondary to tuberculosis of the endometrium. The naked-eye features of a tuberculous tube are often very characteristic, but it is sometimes impossible to distinguish it from a pyosalpinx. In many instances the cœlomic ostium is occluded and the tube tightly stuffed with caseous material (Fig. 87). On removing this material the mucous membrane presents the usual velvet-like appearance characteristic of the walls of a chronic abscess.

In many patients tuberculous lesions are found in other parts of the body, so that it is difficult to decide which is the primary seat of the disease. The bacilli are often difficult of detection; however, when tubes are found distended with caseous pus and deposits containing tubercle bacilli are found in other organs, it may be used as evidence that the disease in the tubes is likewise tubercular. The only absolute test of tuberculous salpingitis is the detection of the tubercle bacilli in the contents or in the tissues of the Fallopian tube.

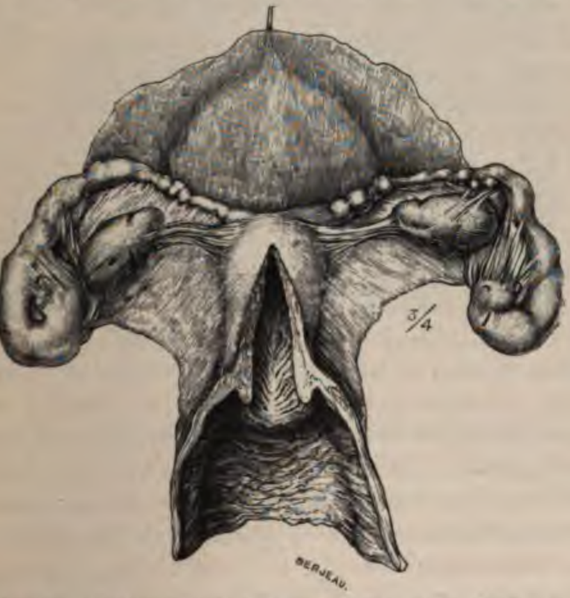


FIG. 87.—TUBERCULOUS SALPINGITIS FROM AN INFANT.

It is an important clinical fact that tuberculous peritonitis in infants, girls, and young women in many instances is due to infection from tuberculous tubes in consequence of the cœlomic ostia remaining unoccluded. Exceptionally infection of the peritoneum has resulted from perforation of the wall of a tuberculous tube with an occluded ostium. It is also probable that the tubes may sometimes be infected secondarily to tuberculous peritonitis, due to tuberculosis of the intestine.

In some cases tuberculous Fallopian tubes become converted into huge banana-like or legume-shaped cysts, which not only appear above the pelvic brim, but may reach as high as the navel. The cœlomic ostia are usually completely occluded, but traces of the fimbriæ may be observed even in extreme cases. These dilated tubes contain pus, which is often viscid like old honey; occasionally it is of the consistence of putty. In some specimens the mucous membrane resembles wet chamois leather. This rare variety of tubal disease seldom causes inconvenience until the enlargement of the tubes produces obvious swelling of the lower part of the belly. Many examples of these large tubes have been carefully described, the patients being virgins, or, if married, sterile.

Occasionally the fluid effused from the unclosed ostium of a tuberculous tube may become encapsuled. When the encapsuled effusion is large, the physical signs furnished by it strongly resemble those furnished by an ovarian cyst. A remarkable case of this kind came under our care; the cyst was as big as a football, and the fringed ostia of both tubes opened into it independently. The cyst was universally adherent, and both tubes were stuffed with pus and furnished tubercle bacilli.

Adenoma.—Tumours composed of glandular tissue have on several occasions been observed growing from the tubal mucous membrane. An adenoma of the Fallopian tube may assume the dendritic form of a large papilloma, or consist of a mass of cyst-like swellings and resemble a bunch of grapes. The stroma of the tumour consists of delicate connective tissue in which glandular acini, lined with a single layer of columnar epithelium, are embedded (Fig. 88). Some of the cysts present in these tumours contain intracystic processes. A curious feature connected with these tumours is the presence of free fluid in the belly—hydroperitoneum. This is due to the secretion from the adenoma escaping through the abdominal ostium of the tube and irritating the peritoneum.

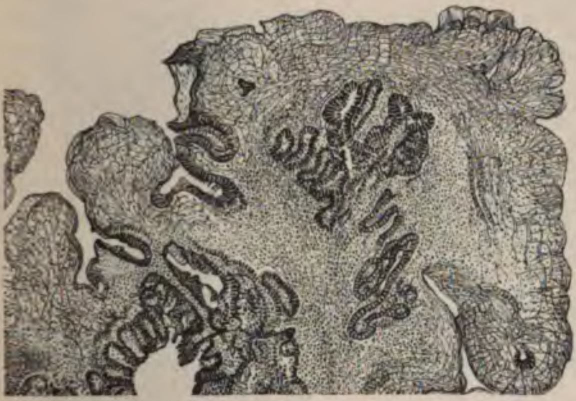


FIG. 88.—MICROSCOPIC CHARACTERS OF AN ADENOMA OF THE FALLOPIAN TUBE.

Although the peritoneal fluid may be evacuated, it accumulates as long as the adenoma is allowed to remain. Removal of the adenoma at once and permanently arrests the effusion.

The inner wall of a dilated Fallopian tube (hydrosalpinx) is occasionally beset with warts (papillomata).

Carcinoma.—The fact that the Fallopian tube may be the seat of adenoma leads us to expect that it would occasionally be affected with primary cancer. Many trustworthy cases have been recorded which establish the fact that this dreadful disease arises in the mucous membrane of the tubes.

The clinical facts concerning it are these:

The patients are generally women about fifty years of age; the chief signs are discharges of blood-stained fluid from the vagina. The disease seems to attack those who have had children, as well as those who are sterile. The outlook for the patient is not good, for the disease, as a rule, returns quickly after the affected tube has been removed.

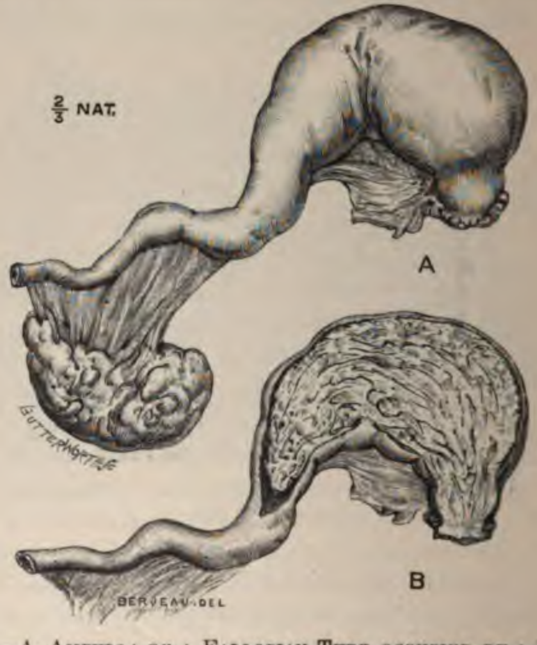


FIG. 89.—A, AMPULLA OF A FALLOPIAN TUBE OCCUPIED BY A PRIMARY CANCER; B, THE AMPULLA OF THE TUBE SHOWN IN SECTION.

From a sterile married woman fifty-seven years of age. The uterus and Fallopian tubes were removed on account of a large fibroid; the existence of the tubal cancer was unsuspected before operation. The growth had made its way through the cœlomic ostium of the tube, and infected the adjacent peritoneum. The patient recovered from the operation, and remained in excellent health for eleven months. Signs of recurrence then appeared in the pelvis, and she died twelve months from the date of operation.

In two remarkable cases under our care (Fig. 89) the disease was associated with large uterine fibroids. In each instance the disease arose in the ampulla of the tube, but in one it crept through the cœlomic ostium and infected the peritoneum, whilst in the other the disease led to occlusion of the ostium, but made its way along the tube to the uterus.

It must be borne in mind when examining suspected cases that cancer arising in the endometrium of the uterus often extends to and implicates the mucous membrane of the uterine segment of one or both Fallopian tubes. It is also a fact worth remembering that when the tubes are thus invaded the microscopic features of the cancer become changed; it loses the peculiar tubular character of the glands of the endometrium, and assumes the fissure-like features which the tubal mucous membrane presents at its uterine segment.

Chorion-epithelioma.—This dread disease may arise in the Fallopian tubes as a sequence of tubal pregnancy. Fortunately, it is uncommon, for it is very fatal.

NOTE.—*Gonorrhœal Salpingitis in Children.*—The pus associated with vulvo-vaginitis in little girls (p. 129) contains, in many cases, gonococci, and the infection may extend from the vagina to the uterus, involve the Fallopian tubes, and even establish a gonorrhœal peritonitis. In one instance dilated pus-containing tubes were removed from a girl six years of age (Bidwell), and gonococci were detected in the vaginal discharge.

Gonorrhœal peritonitis in children assumes a very acute form; in many instances it rapidly subsides.

CHAPTER XXXI

DISEASES OF THE FALLOPIAN TUBES—(*Continued*)

DIAGNOSIS AND TREATMENT.

Acute Salpingitis.—The leading signs of this affection are not dependent on the tubes, but become manifest when the infection extends from the tubes to the pelvic peritoneum. When this disease is secondary to septic endometritis the signs often come on with great suddenness. The discharges from the uterus are offensive; the patient may have a temperature of 100° F. Suddenly she is seized with a rigor; the temperature rises to 103° or 104°; the belly quickly swells, and in twenty-four hours there is clear evidence of infective peritonitis. In some of these cases death follows in a few days; in others the patients slowly recover. When these signs supervene on delivery or abortion, the condition is often called puerperal peritonitis.

Similar attacks are sometimes seen after operations upon the uterus, and may complicate a gangrenous submucous fibroid.

As a rule, slow accession of symptoms indicates gradual extension of infection from mucous and muscular to serous tissue. Sudden onset of the severe signs means actual leakage from the tube into the cœlom (general peritoneal cavity). In some cases acute infection of the peritoneum is indicated by profound collapse. The above signs may be interpreted thus: slow extension produces chronic changes; leakage, as a rule, leads to general infective peritonitis, and not infrequently to death.

It should also be borne in mind that sudden infection of the pelvic peritoneum during labour may arise from the bursting of a pyosalpinx, or a suppurating ovarian cyst of small size.

Acute pelvic peritonitis sufficiently severe to endanger life occasionally occurs in the early stage of gonorrhœa before the cœlomic (abdominal) ostia become sealed.

Treatment.—Acute salpingitis demands absolute rest in bed, and the routine use of mild vaginal injections. The bowels should be kept regular with saline purgatives. When the pelvic pain is very great, warm fomentations should be applied to the hypogastrium, and morphia or opium may be judiciously prescribed.

When the signs indicate extensive fouling of the peritoneum and the patient's life is imperilled, the surgeon may have to consider the advisability of performing cœliotomy. In all cases in discussing treatment the surgeon is bound to remember that his diagnosis is not infallible, and though the signs may indicate leakage from an infected tube, it may be due to a rupture of an ovarian abscess, or an abscess connected with the vermiform appendix. In such cases cœliotomy is the only hopeful course.

Chronic Salpingitis.—This is a very common disease, and one that not infrequently imperils life; even in cases when life is not endangered, the pain and inconvenience these women suffer are often such as to render them chronic invalids.

The chief points are these: The patient is usually between twenty and thirty-five years of age, and furnishes a history of difficult labour or abortion, followed by a protracted illness, since which she has been sterile and suffered from excessive, prolonged, and often painful menstruation. Defæcation and sexual congress are sources of pain; some complain also of a vaginal discharge. Married women, and occasionally single women, furnish details of such a kind as lead us to believe that an attack of gonorrhœa marked the beginning of the trouble. In a large proportion of cases the trouble dates from septic complications following labour or a miscarriage.

The symptoms, briefly summarized, are menorrhagia, pain, and sterility.

Tubercular salpingitis has wider age-limits, as it occurs in children from eighteen months onwards (Fig. 90). In girls after puberty this variety of salpingitis is often accompanied by amenorrhœa, and in some cases with hydroperitoneum.

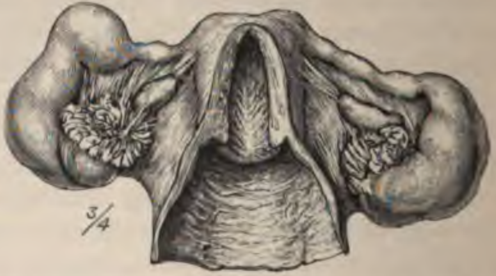


FIG. 90.—TUBERCULAR SALPINGITIS FROM A BABY.

On examining the abdomen, an irregular tender swelling may be sometimes detected in one or both flanks; more frequently there is an indefinite swelling, and in some, on palpation, a sense of resistance can be made out, but in very many cases no swelling can be detected.

On internal examination, there will be found lying on each side of or behind the uterus an elongated swelling, which usually gives rise to great pain when pressed by the examining finger. Not infrequently the uterus is acutely retroflexed, and then the uterine fundus with the enlarged tubes and ovaries forms a rounded ridge running transversely across the pelvic floor.

As a rule, a moderately distended tube can only be felt through the vagina or by the bimanual method.

Tactile judgment is a very important factor in the diagnosis of pelvic swellings. To estimate the size, consistence, fixity, or mobility of a tumour lying in close relationship with the uterus requires experience.

In a general way, it may be stated that it is impossible to accurately diagnose between the various forms of tubal disease, including gravid tubes previous to rupture or abortion, and the following forms of ovarian disease :

1. Tubercular abscess of ovary ;
2. Apoplexy of the ovary, or ovarian pregnancy ;
3. Small ovarian cysts, tumours, or dermoids ;
4. Small parovarian cysts.

The following conditions are very liable to be mistaken for tubal disease :

Retroflexion of the uterus ;
Pelvic cellulitis ;
Fæcal accumulation in the rectum ;
A kidney in the hollow of the sacrum ;
A small uterine fibroid ;
Cancer of the sigmoid flexure of the colon ;
Abscess due to inflammation of the vermiform appendix burrowing into the mesometrium ;
Tumours of the sacrum or innominate bone ;
Tumours of the mesometrium, including echinococcus colonies.

When a Fallopian tube is so distended as to render it capable of being felt above the pelvic brim, it is liable to be, and often is, mistaken for an ovarian cyst. On the other hand, when ovarian and parovarian cysts are not large enough to be felt above the pelvic brim, they closely simulate pelvic cellulitis or distended tubes. *Distended Fallopian tubes simulate fibroids much more closely than ovarian tumours, and vice versa.*

Appendicitis and Salpingitis.—Acute and chronic inflammatory affections of the vermiform appendix give rise to symptoms which simulate very closely those manifested by several pelvic conditions, especially acute and chronic salpingitis, tuberculous disease of the ovaries and Fallopian tubes, tubal pregnancy, and small suppurating ovarian cysts. This is not surprising when we remember that in many women the appendix, the right ovary and tube are in actual contact, and an inflamed appendix may become adherent to the cœlomic ostium, and actually burst into the tube, the pus escaping into the uterus (Figs. 91 and 92).

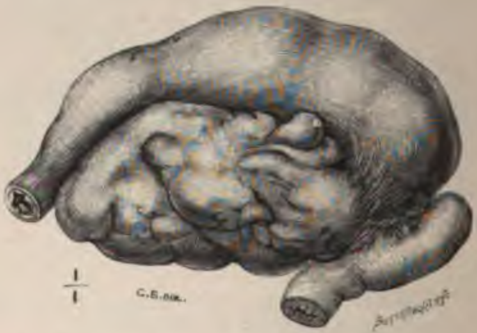


FIG. 91.—AN INFLAMED VERMIFORM APPENDIX ADHERENT TO THE CŒLOMIC OSTIUM OF THE RIGHT FALLOPIAN TUBE.

The vermiform appendix, even when it is healthy, may be occasionally implicated in the adhesions surrounding an enlarged and inflamed ovary or Fallopian tube. In some instances an attack of acute appendicitis will cause the appendix to adhere to an adjacent ovarian cyst, and in the early days of ovariotomy, before surgeons were aware of the intimate association between pelvic tumours and the appendix, the latter has been cut or torn. The accident has not been recognised, and the patient has died from peritonitis. A large abscess resulting from acute appendicitis often occupies the pelvis, and simulates a pelvic abscess, and this condition sometimes complicates pregnancy, and is not uncommon during puerpery.

Treatment.—When the tubal mucous membrane has become seriously damaged and the tubes fixed by adhesions to surrounding structures, then drugs are of little avail. When such persons are able to lead a life of ease they often become chronic invalids and try Continental health resorts, where they visit the springs and indulge in baths, especially the mud-baths of Bohemia. In poorer patients such treatment is out of the question, and in order to lead a useful life, as well as to escape from pain, they willingly submit to surgical measures.

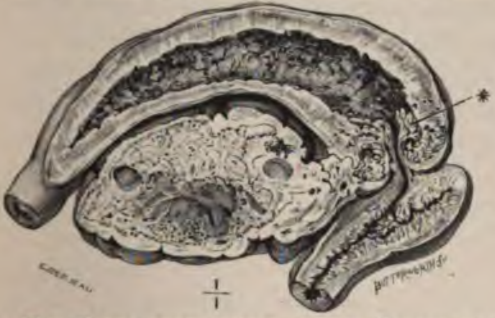


FIG. 92.—THE PARTS REPRESENTED IN THE PRECEDING FIGURE SHOWN IN SECTION.

The vermiform appendix has a perforation near its tip communicating with the lumen of the tube. The fimbriæ curled up in the tube are well shown *. The tube was distended with pus.

The ordinary rules of surgery suggest that when the physical signs indicate that the Fallopian tubes are occluded and distended with pus or other fluid, producing pain and inconvenience, so as to cause the patient to lead the life of a chronic invalid, it is justifiable to remove them.

Removal of the Fallopian tubes and ovaries (oöphorectomy) is justifiable, and the only radical means of treatment in the following conditions: Pyosalpinx and tubo-ovarian abscess; hydrosalpinx; ovarian abscess; tuberculous salpingitis.

In some cases where the uterus is greatly enlarged in association with bilateral pyosalpinx, it is a wise step to remove the uterus with the ovaries and tubes, because even after complete bilateral oöphorectomy the patient may suffer from severe irregular hæmorrhage from the infected endometrium.

In tubercular salpingitis oöphorectomy should only be undertaken when there is no evidence of tubercle in other organs, such as lungs, bladder, or kidneys. The method of performing oöphorectomy is described in the section devoted to the description of operations.

CHAPTER XXXII

EXTRA-UTERINE GESTATION

One of the greatest discoveries man ever made concerning himself was when Von Baer detected the human ovum and established the nature of the human ovary in 1827.

All intelligent individuals now know that the ovum, when mature, escapes from its follicle in the ovary and falls into the cœlomic (abdominal) ostium of the Fallopian tube, to be conveyed by the muscular action of that tube into the uterus; when the environment is favourable, somewhere in transit this ovum (or egg) is fertilized by a spermatozoon and converted into an oösperm (as the fertilized ovum is called), and retained within the uterus; under normal condition it develops into a fœtus, and is finally extruded as a living child.

There is, however, a great deal of uncertainty concerning the place where the ovum becomes fertilized, but it is now established that fertilization may occur whilst the ovum is in the follicle, for oösperms have been detected in the ovary and in the Fallopian tube, as well as in the cavity of the uterus. When an oösperm is formed in any part of the genital tract other than in the cavity of the uterus, it is said to be extra-uterine, and as this may occur in the ovary or in the Fallopian tube, the condition is termed ovarian and tubal pregnancy respectively. There are two anomalous conditions which it is convenient to include under the heading of extra-uterine—namely, pregnancy in the rudimentary cornu of a two-horned uterus (cornual pregnancy), and utero-abdominal pregnancy.

In this and the ensuing chapters, the pathology, the consequences, and the treatment of the varieties of extra-uterine pregnancy will be considered.

OVARIAN PREGNANCY.

Belief in ovarian pregnancy can be traced back for more than 200 years, but a critical examination of the recorded cases shows that in many instances the supposed ovarian fœtus was in some instances a dermoid, in others an extra-uterine fœtus sequestered in the broad ligament (see Chap. XXXIV.). In a few cases the accounts of the dissection are so careful and so circumstantial as to leave an impression on the mind that the development of an embryo in the ovary could not be denied. Capable observers like Velpeau and Farre, though they did not deny the possibility of gestation in the ovary, were satisfied that in none of the reported cases had the fact been proved. In recent years the discovery of the tubal mole has furnished us with a criterion of extra-uterine pregnancy and led active investigators to formulate a postulate on which the occurrence of ovarian pregnancy could be based; they urged, in order to satisfy their doubts, that *an early embryo in its membranes contained in a sac in the ovary* should be forthcoming. These conditions have been satisfied by a remarkable case published by Dr. Catherine van Tussenbroek, of Amsterdam, in 1899. It appears that Kouwer, of Haarlem, in 1893, performed cœliotomy upon a woman thirty-one years of age on account of signs indicating severe abdominal bleeding. The abdomen contained a large quantity of blood, and the source of the bleeding was a swelling the size of a nut in the right ovary. The diseased ovary and tube were removed, as well as the blood-clot, and the patient survived, although it required many months for her to recover from the severe loss of blood.

Van Tussenbroek preserved the specimen, and some years later made careful complete sections through the ovarian "swelling," and has demonstrated beyond any doubt the presence of an early embryo in a sac furnished with chorionic villi and contained in an ovarian follicle. Apart from its interest and value in absolutely proving that an ovum can be fertilized in its follicle, a study of this specimen ought to settle many doubtful points in regard to the source of some of the constituent of the placenta. There is also a point of great importance noticed in the clinical account of this patient—namely, that a decidua had formed in the uterus, and a few days subsequently to the operation was discharged with the *douleurs d'accouchement*.

Some similar cases have been reported in England, and it is an interesting fact that the great reliance which has been placed on the chorionic villi as the determining feature of doubtful specimens of tubal mole is likely to be of equal utility in the case of "ovarian moles."

The whole subject of ovarian pregnancy now stands in a new light, and it opens up a wide field of research for those who get the opportunity to carefully investigate suspected cases of early ovarian pregnancy, and more especially examples of what are called blood-cysts of the ovary, and endeavour to secure a complete series of specimens to fill up the interval between an embryo of a few days and the fully-developed fœtus.

There is not sufficient clinical evidence available to enable us to describe the signs and symptoms which would enable a differential diagnosis to be made between an early ovarian and a tubal pregnancy, nor is it of any consequence, as the treatment of the two conditions is the same. In an early example which I had an opportunity of examining the symptoms were those of an early tubal pregnancy, but the physical signs were those of an ovarian cyst the size of a tennis-ball.

The parts were removed by cœliotomy, and on dividing the ovary a gestation sac of about three weeks was found in it.

TUBAL PREGNANCY.

In order to reach the uterine cavity an ovum must traverse the Fallopian tube. When an oösperm (fertilized ovum) is retained in the tube it develops and gives rise to the condition known as "tubal pregnancy."

Concerning the cause, or causes, of tubal pregnancy nothing is known, and this uncertainty will continue until reliable evidence is forthcoming in regard to the situation in the genital passages where ovum and spermatozoon normally meet. Obstruction to the transit of ova through the tube does not explain matters, for it is a fact that an oösperm is more often retained in the wide ampullary section of the tube than in its narrow uterine segment. Ill-development of the tube may account for some of the cases, but it is more likely that tubal pregnancy is the result of active rather than obstructive causes. It is probable that when an ovum is converted into an oösperm the latter immediately engrafts itself on, or embeds itself into, the subjacent mucous membrane, whether it be tubal or uterine.

Tubal pregnancy may happen as a first pregnancy in women who have been married eight, ten, or even twenty years. A Fallopian tube may become gravid in the newly married or in the mother of a large family. Both tubes may, in very exceptional cases, be gravid concurrently, or one tube may become pregnant years after its fellow. Very rarely two oösperms are retained in the same Fallopian tube—*twin tubal pregnancy*. Tubal may complicate uterine pregnancy.

An analysis of a large number of cases establishes the fact that tubal pregnancy is very apt to occur in women who have been sterile many years, and has given colour to the suggestion that chronic salpingitis and loss of tubal epithelium may predispose to this accident; but careful inquiries have rendered this view untenable, especially when we remember that in some of the specimens the inflammatory changes are the

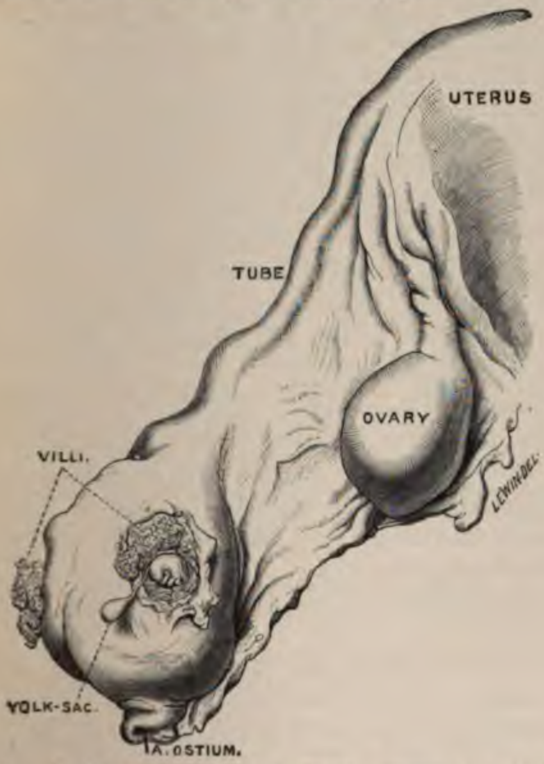


Fig. 93.—A Gravid Fallopian Tube, showing the Cœlomic Ostium in Process of Occlusion.

The tube burst, and the woman died in twelve hours. She had made a hearty supper of mussels, and when she was taken ill in the night the symptoms were thought to be due to poisoning. The post-mortem examination was made on a coroner's warrant. (From Bland-Sutton, "Diseases of the Ovaries and Tubes.")

consequence rather than the cause of the accident ; indeed, a series of investigations on an abundant supply of material teaches us that *a healthy Fallopian tube is more likely to become gravid than one which has been inflamed.*

Our ignorance of the cause of tubal pregnancy is due to the fact that we know nothing of the changes in the human oösperm in its early days. One of us (Bland-Sutton) has for many years urged that tubal pregnancy is the result of active changes, and Ballantyne's suggestion appeals to us. He writes : " The trophoblast is recognised as the means by which the oösperm attaches itself to the uterine wall. Should it be detained in the tube until the trophoblast be fully formed, or if the trophoblast be formed prematurely, it may effect a lodgment in the tubal mucosa."

The events which follow the retention of an oösperm in a Fallopian tube vary according to its position, thus :

When it lodges in the ampulla and isthmus it is called **tubal gestation.** But when an oösperm is retained in the portion traversing the uterine wall it is known as **tubo-uterine** gestation.

The stages of tubal pregnancy will be described in sections, as follows :

Changes in the tube ; the tubal mole ; tubal abortion ; tubal rupture ; erosion of the tube.

The Changes in the Tube.—During the first month or six weeks following the lodgment of an oösperm the tubal tissues are swollen and turgid ; occasionally at the site where the villi are implanted the tubal wall becomes very thin. This is due to the phagocytic activity of the trophoblast. The precise relation of the chorionic villi to the tubal tissues has been made the subject of careful investigation (Fürth, Lockyer), which show that the cells of the villi make their way through the mucosa, and become implanted in the muscular wall of the tube. This is known as the intramural embedding of the placenta, or better, *intramuscular implantation of the villi.* It has also been shown from an examination of some early specimens of tubal pregnancy that the oösperm may entirely encyst itself in the muscular wall of the tube (Comyns Berkeley and Bonney). In many cases, especially when the oösperm is lodged in the ampulla of the tube, the cœlomic ostium gradually closes by a process very analogous to that described as resulting from salpingitis. Occlusion of the ostium is a slow process, and requires probably eight weeks for its completion. When the oösperm is retained in the isthmus or in the uterine section of the tube the cœlomic ostium is rarely affected. In a fair proportion of cases the ostium dilates instead of contracting. There is as yet no good explanation forthcoming in regard to these two opposite conditions, but they exercise an important influence on the subsequent course of the pregnancy. Microscopic investigation of the uterine orifice of the tube serves to show that it is not obstructed when the tube is gravid. Mere investigation by means of a bristle or probe is too rough a method to be reliable.

The Tubal Mole.—The following account of the tubal mole is based upon a careful study of 130 specimens. The changes which occur in the oösperm are the same whether it be lodged in a Fallopian tube or in the uterine cavity; in each situation it is extremely liable to become converted into what is known as a "mole." Such a body is an early embryo and its membranes into which blood has been extravasated. Tubal moles vary greatly in size: some have been detected with a diameter of 1 centimetre; others measure 5 or even 8 centimetres. Small tubal moles are globular, but after they attain a diameter of 3 centimetres they become ovoid (Fig. 94). The amniotic cavity usually occupies an eccentric position; occasionally the embryo is detected within it (Fig. 95). More often it escapes, or is destroyed by the original catastrophe which formed the mole. When an embryo, amniotic cavity, or chorionic villi cannot be detected by the naked eye, a microscopic examination of sections will often lead to the detection of chorionic villi (Fig. 48, p. 179). They are characteristic structures, and as certain evidence of tubal pregnancy as the embryo itself. When examined under a low power of the microscope a chorionic villus presents an external layer of epithelium, and the central space is occupied by connective-tissue cells. Under a high power the so-called epithelium

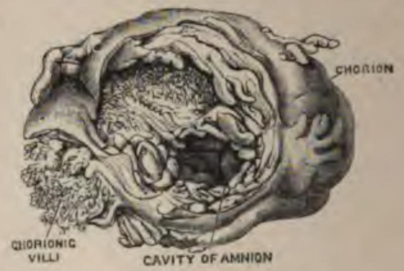


FIG. 94.—TUBAL MOLE, WITH FREE CHORIONIC VILLI.
From a case of complete tubal abortion; natural size.

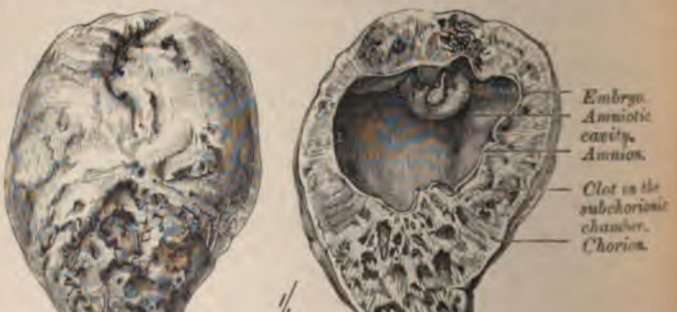
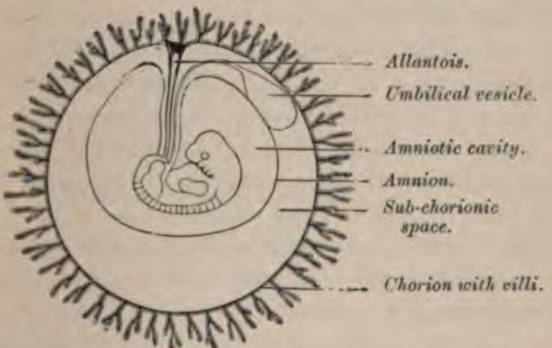
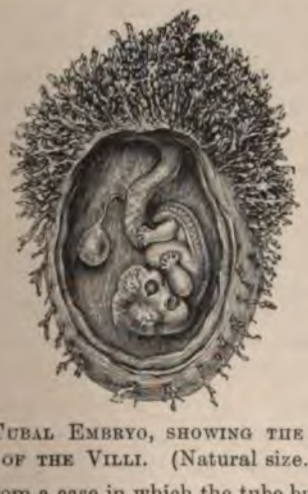


FIG. 95.—TUBAL MOLE, WHOLE AND IN SECTION.

embles more than anything else a large multinuclear cell veloping the villus, its nuclei being arranged with great



96.—DIAGRAM TO SHOW THE EARLY RELATION OF THE AMNION AND CHORION AND THE SUBCHORIONIC CHAMBER.



97.—EARLY TUBAL EMBRYO, SHOWING THE POLAR DISPOSITION OF THE VILLI. (Natural size.)

From a case in which the tube burst.

ularity. In large villi a double row of cells are often seen. outer investing layer of the chorion is sometimes called the syncytium, and has assumed great importance in relation to deciduoma.

It is an interesting fact that the blood in a tubal mole lies between the chorion and the amnion in a temporary space known as the subchorionic chamber (Figs. 96, 97). This blood is derived from the circulation of the embryo, and a large proportion of the red corpuscles are nucleated.

Tubal moles only arise in the first two months following fertilization. The laminated condition of the clot presented by some of these bodies indicates that a mole is sometimes formed by a succession of hæmorrhages.

Although tubal pregnancy is extremely common, it is very singular that in nearly every case of rupture or abortion before the twelfth week the products of conception are represented by a mole. In many scores of cases we found only two exceptions, and the specimen, Fig. 97, was one.

This shows that a Fallopian tube is by no means a favourable situation for the development of an oösperm; indeed, its detention in the tube is disastrous, and a German writer pithily sums it up thus: "Das Ei gräbt in der Tube nicht nur ein Bett, sondern auch sein Grab." With equal truth we add that it is an event which consigns many healthy women to an early grave.

NOTE.—Mr. Bland-Sutton's original account of the tubal mole will be found in the *Medico-Chirurgical Transactions*, vol. lxxiii., p. 55. In that paper the mole is called an "apoplectic ovum" from the Fallopian tube. The paper was communicated to the Society in October, 1889.

CHAPTER XXXIII

TUBAL PREGNANCY—(*Continued*)

TUBAL ABORTION.

THE presence of an oösperm in the ampulla of the tube may lead to occlusion of the cœlomic ostium; this event is commonly complete by the end of the sixth, but is sometimes delayed to the eighth, week.

So long as this orifice remains open, the oösperm is in constant jeopardy of being extruded into the cœlom (peritoneal cavity); the nearer it is situated to the ostium the greater the risk of its ejection from the tube (Fig. 98). To this accident the term **tubal abortion** is applied, for it is parallel to those early abortions occurring in uterine gestation before the end of the second month; and it further resembles them in the fact that the oösperm is nearly always converted into a mole.

In tubal abortion blood escapes into the cœlom (peritoneal cavity) through the ostium, accompanied with the usual signs of internal bleeding, and death may occur early from the anæmia thus induced, or from shock. In such instances the mole, being very small, may escape recognition when the clot is examined, either at the operation or post-mortem. Tubal abortion can only occur during the first two months; when the ostium is occluded, the blood cannot escape without rupture of the sac. The quantity of blood which escapes from the tube into the cœlom sometimes measures 2, 3, and even 4 litres. Tubal abortion is a subject of much interest, inasmuch as it furnishes many of the cases of pelvic hæmatocele which are ascribed to metrorrhagia, reflux of menstrual blood from the uterus, and hæmorrhage from the mucous membrane of the Fallopian tube. The reason for associating the hæmorrhage with metrorrhagia and menstruation is due to the fact that, whilst the embryo is growing in the tube, a decidua is forming in the uterus. When tubal abortion occurs, hæmorrhage takes place from the uterus consequent on the separation and expulsion of the decidua. Should this accident happen near the time when the patient expects to menstruate, the case is apt to be regarded as reflux of menstrual fluid into the cœlom. In some cases the blood discharged from the uterus is partly derived from the gravid tube; this especially happens in cases of protracted tubal abortion. If it does not coincide with a menstrual period, it is then usually considered to be of uterine origin. It will therefore be well, in searching blood removed in abdominal operations, to examine carefully any apparently organized ovoid clot, in order to ascertain if

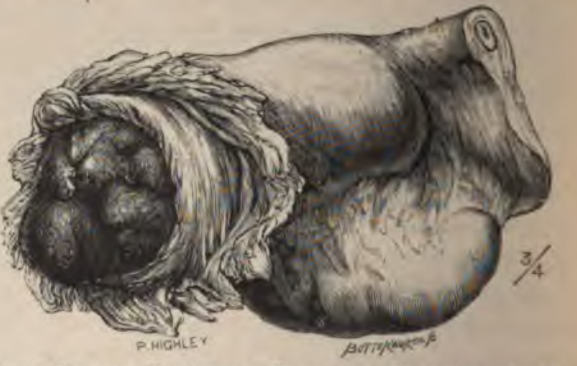


FIG. 98.—A GRAVID FALLOPIAN TUBE AND OVARY REMOVED FROM A SINGLE WOMAN TWENTY-THREE YEARS OF AGE.

At the time of the operation the mole was in process of extrusion from the tube. (Museum of the Royal College of Surgeons.)

it possess an amniotic cavity, with or without an embryo, and also to determine the existence or otherwise of chorionic villi.

It is necessary to bear in mind that in early uterine abortion the mole often fails to become completely detached from the uterine wall; bleeding recurs so long as the mole is retained. In tubal pregnancy the same thing happens; the mole remains attached by its villi and is not ejected from the tube, and gives rise to recurrent hæmorrhage, or maintains a more or less continuous "blood-drip" into the pelvic cavity

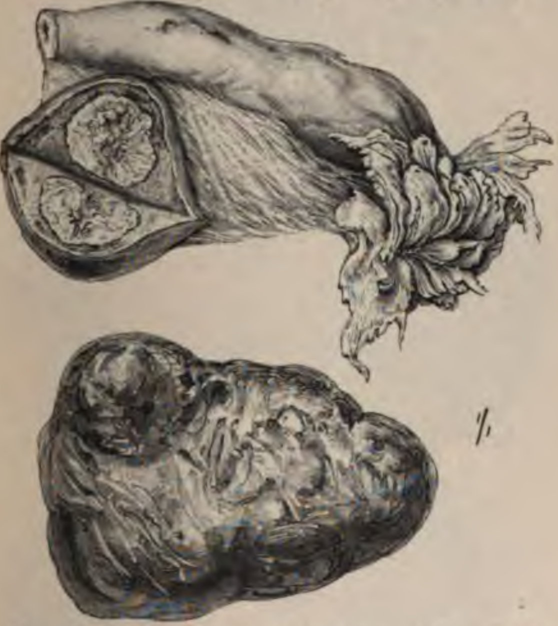


FIG. 99—FALLOPIAN TUBE, OVARY (CONTAINING A CORPUS LUTEUM), AND MOLE, FROM A CASE OF COMPLETE TUBAL ABORTION.

The patient was thirty-five years of age, mother of ten children, the youngest being three months old.

(Taylor). This may be described as *incomplete tubal abortion*, and is more common than the complete form.

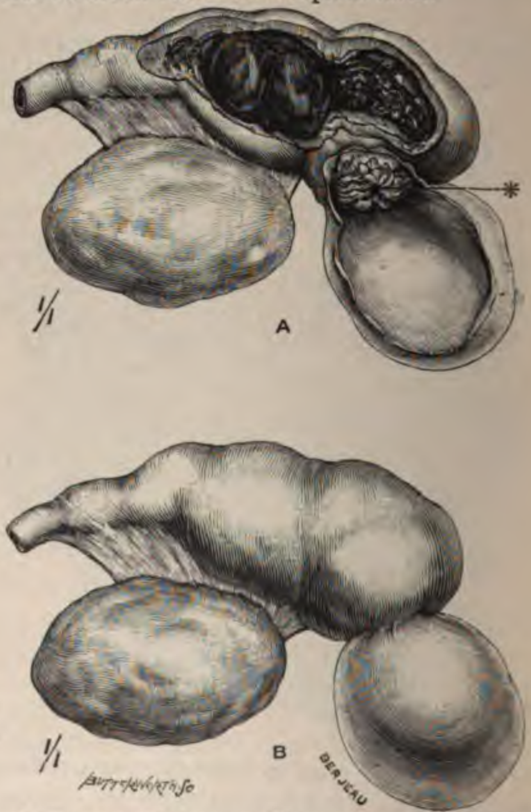


FIG. 100.—A GRAVID FALLOPIAN TUBE WITH A PSEUDO-CYST OR CAPSULE FORMED AROUND BLOOD EFFUSED THROUGH ITS CŒLOMIC OSTIUM.

A shows the capsule in section, and B entire; * tubal fimbriæ.

When blood slowly trickles from the cœlomic ostium of the tube in cases of incomplete tubal abortion, it is apt to become encysted, and the outer surface of the clot is encased by a regular capsule. In many instances this capsule, or **peritubal hæmatocele,** is so perfect that it may be enucleated entire; and when the blood is carefully removed the capsule appears as a cyst at the extremity of the Fallopian tube, with the fringed ostium opening into it (Fig. 100). This condition was detected independently by Sänger and Taylor. The essential factor in the formation of a peritubal hæmatocele seems to be the slow trickling or "blood-drip" from the gravid tube. Similar capsules form around inflammatory exudations from the tube, in association with gonorrhœal and tuberculous salpingitis (see p. 272). See also Paratubal Hæmatoceles, p. 302.

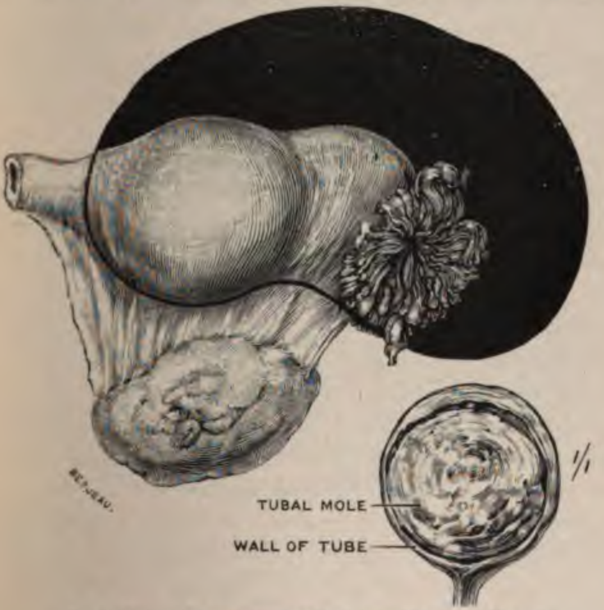


FIG. 101.—A GRAVID MOLE-CONTAINING TUBE.

The blood clotted and distended the tube until it assumed the shape shown in black; the clot was then slowly discharged through the cœlomic ostium. Four clots were found in the pelvis.

It is important to remember that a gravid mole-containing tube will, after discharging the mole through its cœlomic ostium, return to its normal size exactly like the uterus after labour (Fig. 95). In regard to this, the student should remember that if anyone unacquainted with the remarkable properties of unstriped muscle were shown a fœtus at term in the amnion, and the uterus in which it developed, an hour after delivery, he would have his credulity sorely tried to be persuaded that the amnion and contents had been housed in the centre of the uterus. We make this observation because some thoughtful men, thoroughly familiar with the behaviour of the uterus, fail to comprehend that a similar state of things happens with the Fallopian tubes.

In some very rare cases of incomplete tubal abortion the blood accumulates and coagulates in the tube, and the clot is gradually discharged through the cœlomic ostium into the pelvis, each " delivery " being accompanied by an attack of pain. These clots are uniform, contain no limiting organized membrane or internal cavity, and could only by the most inexperienced be mistaken for a tubal mole (Fig. 101).

Tubal abortion has become a subject of importance. When attention was first drawn to the accident many observers regarded its occurrence as questionable or of great rarity ; now the condition is well recognised, and in the practice of some observers it is reported to be the most frequent mode by which tubal pregnancy terminates (Cullingworth and Taylor). In our very long series of cases the proportion of tubal abortion to rupture of the tube is as 1 to 4.

It has been assumed that tubal abortion only occurred in the early weeks, but a case has recently been described in which the embryo was retained in the tube until it attained the size of 10 centimetres ; abortion occurred, and the whole of the fœtus was discharged through the cœlomic ostium of the tube, except its head, which was too large to pass (Cullingworth and Fairbairn).

It has also been proved that a tubal fœtus may escape from the gestation sac into the belly, and sever its connections with the placenta without destroying its mother. Dr. Mendes de Leon has published a remarkable example of this. He removed a fœtus of the sixth month tightly enclosed in its amnion, but adherent to the great omentum; it had no connection with any other abdominal viscus. At the operation he removed also an enlarged Fallopian tube which contained an atrophic placenta, clearly indicating the primary situation of the gestation.

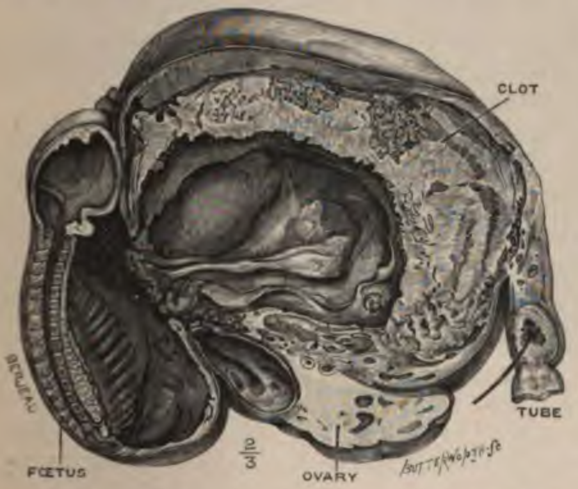


FIG. 102.—A GRAVID FALLOPIAN TUBE IN WHICH THE FŒTUS HAS BEEN SLOWLY EXTRUDED FROM THE TUBE.

Dr. Cullingworth's case. (Museum of St. Thomas's Hospital.)

Cullingworth has published an account of a very exceptional example of tubal pregnancy, which is useful as illustrating the manner in which a fœtus is extruded from a tubal gestation sac. The specimen shown in section (Fig. 102) represents two compartments; the inner is occupied by the placenta, engorged with blood and clot, and the outer sac contains a fœtus surrounded by a delicate membrane, probably amnion. In this instance the fœtus was extruded either through a rent in the tube or perhaps through the cœlomic ostium, but retained its connection with the placenta. In Mendes de Leon's specimen the extrusion was complete. Pestalozza operated on a woman for secondary abdominal pregnancy, and found a fœtus in the recto-vaginal pouch; the placenta occupied the ampulla of the tube, and the umbilical cord passed through the cœlomic ostium of the tube. According to a recent observation, it is possible for a fœtus to go to full term in a Fallopian tube (Amos).

NOTE.—*Chorionic Polypus.*—In some cases described as "incomplete tubal abortion" the small body found in the tube adherent to the mucous membrane does not represent the whole mole, but merely a small mass of chorionic villi at the site of implantation left after the expulsion of the main portion of the mole. Such a body becomes hard and rounded like a placental polypus in the uterus, and is as mischievous, inasmuch as it keeps up a persistent trickling.

CHAPTER XXXIV

TUBAL PREGNANCY—(*Continued*)

RUPTURE AND EROSION OF A GRAVID TUBE.

As a rule, every gravid tube left to itself either aborts, bursts, or is eroded. When from any cause the pregnancy is disturbed before the cœlomic ostium is occluded, the probability is in favour of abortion, but a gravid tube may rupture in spite of a patent ostium. When the pregnancy advances until the ostium is closed, then the tube usually bursts at some period between the sixth and tenth week following impregnation; this accident is rarely deferred till the twelfth week. In one or two very exceptional cases tubal pregnancy has gone to the sixth month without rupture. In one very carefully observed case tubal pregnancy supervened on a single insemination. The tube burst on the fifteenth day, and the woman died in a few hours (Rumley Dawson). This is called primary rupture, and may be intraperitoneal or extraperitoneal. The determining causes of the rupture are of various kinds, such as jumping from a train, chair, or carriage, defæcation, sexual congress, examination of the uterus, etc. Occasionally no such influence is demonstrable. **Erosion** is a much rarer event in the course of tubal pregnancy than abortion or rupture, and will be considered separately. A gravid Fallopian tube may undergo axial rotation; instances of this rare accident have been recorded by Martin and Pozzi.

The predisposing causes of rupture are the gradual attenuation of the walls of the gestation sac and the undue distension of the membranes by hæmorrhage. The tubal wall is particularly thin at the seat of implantation of the chorionic villi, and this thinning is due to the aggressive action of the cells of the villi.

Primary Intraperitoneal Rupture.—In this variety the rupture is so situated that the blood escapes into the cœlom and inundates the recto-vaginal fossa. The embryo or mole may escape through the rent or be detained in the tube.

The blood effused may amount to 2 litres, or even more. Extravasations of this kind were formerly called pelvic hæmatoceles. This term could, with advantage to the student, suffer obliteration.

The dangers of primary intraperitoneal rupture of a gravid tube are rapid death from hæmorrhage, or death from repeated hæmorrhages. Women occasionally survive a limited hæmorrhage, and the effused blood slowly absorbs. When the bleeding is not excessive, the blood collects in the recto-vaginal fossa, and floats up the coils of intestines, and these, with the omentum, gradually form a covering to the fossa by adhering together, thus isolating the blood in the pelvis from the general peritoneal cavity. Handley has shown that when the blood slowly escapes through the rent in the tube it may occasionally be encapsuled, as so frequently happens in tubal abortion (see p. 297). He terms this condition a *paratubal hæmatocele.*

It has been pointed out (Comyns Berkeley and Bonney) that in some instances when the gestation sac bursts the effused blood forces its way between the circular and longitudinal muscular layers of the tubes. An intramural tubal hæmatoma of this kind may burst through the peritoneal coat, or into the lumen of the tube, terminating in the latter case as a tubal abortion. In one specimen an extravasation of ceed from a gestation sac, lodged at the junction of the isthmus and ampulla, forced its way along the tubal wall to the cœlomic end ; it then burst through the mucous membrane near the ostium.

Primary Extraperitoneal Rupture.—In a small proportion of cases the tube bursts in that portion of its circumference lying between the folds of the mesosalpinx. When this happens, the mole and a varying amount of blood are forced between the layers of the mesometrium. As a rule, the bleeding is arrested before it assumes dangerous proportions, in consequence of the resistance which occurs when the mesometric tissues become distended. This is fortunate, for the blood and mole are entombed in the mesometrium, and rarely cause subsequent trouble.

Rupture may take place, the embryo with its membranes remain uninjured, and the pregnancy continue ; for, no longer confined within the narrow limits of the tube, it begins to avail itself of the additional space thus offered, and burrows, as it grows, between the layers of the mesometrium.

According to the manner in which this mode of rupture is sometimes described, it might be imagined that the tube splits and the products of gestation are suddenly discharged from the tube into the mesometrium. This is not the case, or the pregnancy would in every instance come to an end from the dissociation of the fœtal from the maternal structures. A careful study of the morbid anatomy of the accident indicates that the slow and gradual distension of the tube causes it to thin and gradually yield in that part of its circumference uncovered by peritoneum, until an opening forms, accompanied by sudden hæmorrhage, which produces collapse, the profundity and duration of which depend upon the amount of blood effused. This artificial opening is gradually extended by the growing embryo and placenta as they slowly occupy the new area of connective tissue thus opened up.

When the gestation continues in this way it is termed mesometric pregnancy, because the sac is formed in part by the expanded Fallopian tube, but mainly by the peritoneum forming the mesometrium (broad ligament).

Erosion of the Tube.—It occasionally happens that an oösperm developing in the tube will slowly distend it, and gradually erode the walls of the gestation sac until the amnion protrudes into the general peritoneal cavity without any of the striking signs indicating the yielding of the tube. Gestation under these conditions may continue, and the fœtus go to term; it may then die, the amniotic fluid absorbs, and the fœtus

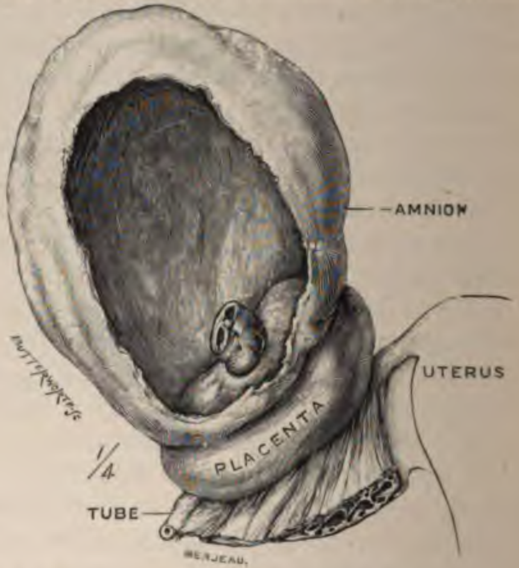


FIG. 103.—THE AMNION AND PLACENTA DUE TO AN OÖSPERM WHICH LODGED IN THE TUBAL ISTHMUS.

The amnion slowly eroded the tubal wall. At term the fœtus escaped through a rent in the amnion, and disported itself among the intestines.

tightly girt in its amnion, becomes mummified, or even converted into a lithopædion without invading the mesometrium.

In rarer cases the fœtus continues to live and grow ; finally it emancipates itself from its amniotic prison, and moves freely about among the intestines and abdominal viscera, merely tethered by the umbilical cord (Fig. 103). For this satisfactory advance in our knowledge we are indebted to Taylor, and his observations finally dispose of the myth that oösperms may become engrafted on the peritoneum.

The Decidua and Placenta.—In tubal gestation the placenta is liable to many vicissitudes which influence very seriously the life of the fœtus, and are such grave sources of danger to the mother that they demand great consideration from the surgeon.

A uterine placenta consists of fœtal and maternal elements, but a tubal placenta possesses fœtal elements only (chorionic villi), for in a tubal pregnancy the decidua forms in the uterus, not in the tube ; further, the tubal mucous membrane takes very little share in the formation of the placenta. The evidence on which we state that in tubal pregnancy there is no decidua in the tube is based upon a careful microscopic examination of twenty-five gravid tubes in the very early stages (four to ten weeks).

The Decidua.—In all varieties of tubal pregnancy a decidua forms in the uterine cavity ; it is rarely retained until term ; when it is, the membrane is thrown off during the false labour characteristic of that period. More frequently the decidua is discharged in pieces during the early period of labour or is expelled whole with signs of miscarriage. Deciduæ vary in thickness from 6 to 8 millimetres. They may be described as bags resembling in outline an isosceles triangle (Fig. 104). The base corresponds to the fundus of the uterus, and the apex to the internal opening of the cervical canal. At each angle of the triangle there is an opening. Those at the basal angles correspond to the Fallopian tubes and are small; the apical orifice corresponds to the cervical canal and is often large. The outer aspect is shaggy, and the inner surface is dotted with the orifices of uterine glands.

The *histology* of a decidua is best studied in sections cut parallel with the surface. In this way the epithelium lining the ducts of the uterine glands is well shown. The spaces not lined with epithelium are bloodvessels.

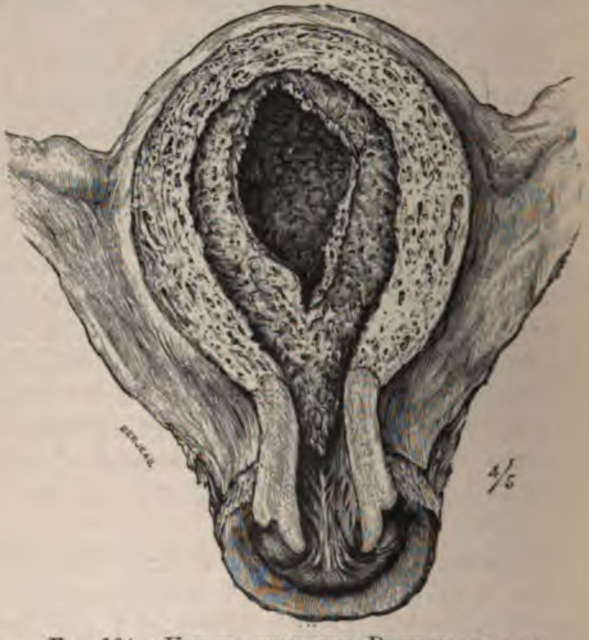


FIG. 104.—UTERUS WITH THE DECIDUA IN SITU.
From a case of tubal pregnancy.

It is useful, for clinical purposes, to be familiar with the microscopic characters of deciduæ, because it happens that an early uterine abortion often simulates primary rupture of a gravid tube, and *vice versâ*. On examining shreds which have escaped from the vagina one is able to decide by means of the microscope whether they are fragments of decidua or chorionic villi from a uterine conception.

Placenta.—Up to the date of primary rupture the formation of the placenta has been proceeding in relation with the mucous membrane of the tube, but after this occurrence, if the disturbance is not severe enough to terminate the pregnancy, the course of events is modified in a remarkable manner, and the ultimate result is largely determined by the relative position of the fœtus and placenta.

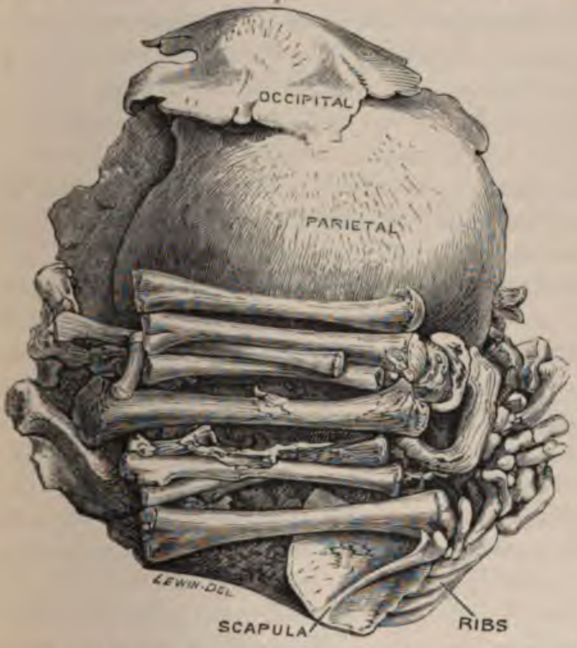


FIG. 105.—MASS OF FŒTAL BONES FROM A CASE OF TUBAL PREGNANCY.

From Bland-Sutton, "Diseases of the Ovaries and Tubes."

When the embryo is situated above the placenta the latter gradually grows and insinuates itself between the layers of the mesometrium (broad ligament) until it comes to rest upon the floor of the pelvis. Should the embryo lie below the placenta the fœtus will ultimately come to rest on the pelvic floor, and the placenta will be pushed upward by the growing fœtus.

This gradual disturbance leads to disastrous changes, such as repeated hæmorrhages into the placenta, which impair its functions and lead to arrest of development and death of the fœtus. A tubal fœtus, even when it survives to term, is always an unsatisfactory individual. When rescued by the surgeon these fœtuses rarely live more than a few weeks or months. Many are ill-formed and present hydrocephalus, club-foot, ectopia of the viscera, and the like.

Should the fœtus die early the placenta gradually atrophies, and in cases of lithopædion there is no trace of it.

Secondary Rupture of the Sac.—The constant tension to which the gestation sac is exposed may, if increased by a sudden hæmorrhage, lead to rupture and death. This is known as "secondary intraperitoneal rupture." Occasionally the gestation continues to term; then symptoms of labour set in, and, as delivery by the natural channels is impossible, the sac may burst into the cœlom. Escaping this, the fœtus dies, and, remaining quiescent, becomes mummified or is transformed into a lithopædion. Later the soft parts may become adipocere, or decompose. When the fœtal tissues putrefy then the pus bursts through the bladder, rectum, vagina, or through the abdominal wall, and fragments of fœtal tissues and bones are discharged from time to time.

A lithopædion—that is, a fœtus whose tissues are impregnated with lime salts (calcified)—may remain quiescent many months or even fifty years, or it may never cause trouble. It is always a potential source of danger, for if pathogenic micro-organisms gain access to it, suppuration is the inevitable consequence. In a few rare instances an entire extra-uterine fœtus has been extruded by sloughing through the abdominal wall in the neighbourhood of the umbilicus (navel delivery).

In many instances the delivery has been completed by surgeons. In one instance the fœtus was removed by a butcher; the woman recovered, and the account of this remarkable case concludes in this way: "She had a navel rupture owing to the ignorance of the man in not applying a proper bandage." This is a good instance of professional bias in the apportioning of blame (*Phil. Trans.*, abridged edition, 1805, vol. viii., p. 517).

Tubo-uterine Gestation.—When an oösperm lodges in that section of the tube which traverses the uterine wall it is termed tubo-uterine gestation. It is rare, many specimens described under this name being examples of pregnancy in the rudimentary horn of a unicorn uterus.

This variety runs a somewhat different course to the common variety of tubal pregnancy. For example, primary rupture may be delayed to the sixteenth week. The sac may rupture in two directions. It may burst into the cœlom, and is often rapidly fatal; or it may rupture into the uterine cavity and be discharged like a uterine embryo: this latter mode of termination has never been proved. A tubo-uterine gestation sac never ruptures into the mesometrium (broad ligament).

Although in many examples of tubo-uterine gestation primary rupture may be longer delayed than in purely tubal gestation, nevertheless the sac sometimes bursts very early; in such cases the patient sometimes dies within a few hours from hæmorrhage.

An examination of the clinical details of cases of undoubted tubo-uterine gestation indicates that intraperitoneal rupture of the sac is more rapidly fatal in the tubo-uterine than in the purely tubal form. This is due to the greater amount of hæmorrhage, because not only are the walls of the gestation sac thicker, but the rent often extends to, and involves, the wall of the uterus.

Cornual Pregnancy.—It is pointed out in Chapter V. that the uterus sometimes presents the bicorned condition

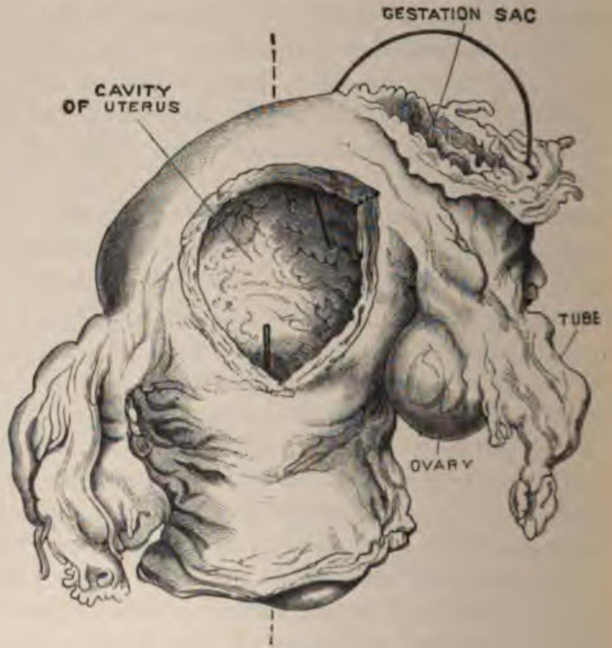


FIG. 106.—TUBO-UTERINE PREGNANCY.

The gestation sac ruptured at the end of the second month. (Museum of the Royal College of Surgeons; from Bland-Sutton, "Diseases of the Ovaries and Tubes.")

characteristic of many mammals, such as cows, mares, and ewes. It is well established that a two-horned uterus in women may become gravid, the pregnancy go to term, and delivery terminate as happily as in an organ of normal shape. When one horn only is gravid—and this is the usual condition

—the non-gravid cornu enlarges, and a decidua is developed within it. When a woman with a bicorned uterus comes under observation in the early stages of pregnancy, and is submitted to physical examination, there is great probability that the unilateral position of the enlarged cornu will lead to an erroneous diagnosis, and several cases have been recorded in which, under the supposition that the patient was suffering from an ovarian tumour, uterine fibroid, or tubal pregnancy, cœliotomy has been performed. In some instances the gravid half of the uterus has been amputated before the nature of the condition was appreciated.

There is, however, a variety of cornual gestation of deep interest to the surgeon. When an oösperm lodges in the rudimentary cornu of what is known as the "unicorn uterus" (Fig. 16, p. 46), gestation may proceed without inconvenience for three or more months; but, as delivery by the natural passages is impossible, the ultimate results are similar to those of tubal pregnancy.

The clinical signs of gestation in the rudimentary horn of a unicorn uterus are those of tubal pregnancy, and in many instances even during post-mortem inspection the nature of the lesion is overlooked.

The relation of the round ligament to the gestation sac forms a ready means of distinction between a gravid Fallopian tube and a cornual pregnancy:

(1) In a normal uterus the round ligament springs from the upper angle, immediately in front of the tube (Fig. 10, p. 38).

(2) In tubal gestation the round ligament is attached to the body of the uterus on the uterine side of the gestation sac.

(3) In cornual pregnancy the round ligament is situated on the outer side of the gestation sac.

Pregnancy in the rudimentary cornu of a unicorn uterus runs a different course to tubal pregnancy. In the case of the tube, rupture (or abortion) usually occurs before the twelfth week, whereas in the case of a rudimentary cornu the gestation may go on to full term, and then ineffectual labour leads to the death and subsequent mummification of the fœtus (in rare cases the sac may become infected and suppurate, and eventually nothing but a sequestered collection of macerated bones be left); or the gestation sac may rupture at any period from the second to the ninth month.

There is another feature of great importance in the anatomy of these rudimentary cornua. A fair number of specimens have been reported since Kussmaul drew attention to the anomaly in his classical work (1859); the subject has also received the attention of such observers as Virchow and Turner, and in nearly all the recorded cases the gravid rudimentary cornu was attached to the well-developed cornu by a solid fleshy pedicle; even after a very minute and careful examination, the reporters have failed to detect a channel in this pedicle by means of which the gravid rudimentary cornu could communicate with the cervix of the well-formed uterine horn, or the vagina.

This, of course, brings into prominence the channel by which the ovum, gaining entrance into the cavity of the rudimentary cornu, becomes fertilized. The only available explanation is this:—the spermatozoa reach the recto-vaginal fossa by way of the Fallopian tube attached to the well-developed half of the uterus, and fertilize the ova furnished from the ovary belonging to the rudimentary cornu. Some writers on this subject suggest that an ovum from one side may find its way into the cœlomic ostium of the opposite or rudimentary cornu, and seek to substantiate this on the ground that, in some of the cases where the rudimentary cornu was gravid, the corpus luteum of pregnancy was found in the ovary of the opposite side—that is, in the ovary corresponding to the well-developed tube.

When pregnancy occurs in one cornu of a two-horned uterus a decidua forms in the unimpregnated horn. Whether a decidua forms in rudimentary horn under such conditions has not been determined.

The diagnosis of pregnancy in a rudimentary cornu is a matter of uncertainty. It is often mistaken for tubal pregnancy and for a uterine fibroid. As a matter of fact, the nature of the case has been overlooked, even when the parts removed from the body were submitted to dissection.

Cornual pregnancy is interesting from another point of view. A careful search through veterinary literature shows that there is no specimen or description of a case of tubal pregnancy in a mammal other than the human female that will bear criticism. The cases published as extra-uterine gestation are examples of rupture of one of the long gravid uterine cornua, or of the uterus itself; it is a curious fact that in the hare, which has a pair of long uterine cornua, two carefully-described cases are known in which a gravid cornu underwent axial rotation (Hutchinson, Dohrn)

There is also good ground for the belief that a gravid rudimentary uterine cornu in the human subject has twisted its pedicle.

Utero-abdominal Pregnancy.—Among the anomalous varieties of gestation it is necessary to draw attention to one of great interest as well as rarity described by Leopold in 1896. A woman, when near the mid-period of pregnancy, injured herself by slipping down the cellar steps. When she arrived at what she reckoned to be "term," extra-uterine pregnancy was diagnosed and cœliotomy performed. A fœtus of about the fourth month of gestation, enclosed in a thin amniotic sac, was found in the abdomen, and its umbilical cord passed through a rent in the back of the uterus. Subsequently the uterus with the placenta was removed with success. In this instance the uterus was injured, and the fœtus in its amnion was slowly extruded through the rent in the posterior uterine wall into the belly.

CHAPTER XXXV

TUBAL PREGNANCY—(*Continued*)

DIAGNOSIS.

THE signs of tubal pregnancy vary according to the stage of the gestation; they will therefore be dealt with in sections, thus:

1. Before primary rupture or abortion;
2. At the time of primary rupture or abortion;
3. From the date of primary rupture to term;
4. At and after term.

1. **Before Rupture or Abortion.**—Since the pathology of the early stages of tubal pregnancy has been carefully investigated, and a clear distinction recognised between a gravid tube and a hæmatosalpinx, many cases have been recorded in which a correct diagnosis was made before the operation was undertaken. This is very gratifying, and it is a matter of great importance for the patient, as it spares her the awful peril which attends rupture of the tube.

The patient usually gives a definite history of a missed menstrual period after having been previously regular; following on this event, she begins to experience pelvic pain which induces her to seek advice. On examination, an enlarged Fallopian tube is detected. When there is no history of old tubal disease, or any fact in the history of the patient suggesting septic endometritis or gonorrhœa, then presumption favours a gravid tube.

2. **At the Time of Primary Rupture or Abortion.**—The tube bursts or abortion occurs at some period

before the twelfth week; the effect upon the patient depends upon the seat of rupture. When it takes place between the layers of the mesometrium (broad ligament), the symptoms will, as a rule, be less severe than when the tube bursts into the cœlom, because the pressure exercised by the blood extravasated into the tissues of the mesometrium tends to check hæmorrhage; whereas the cœlom will hold all the blood the patient possesses, and yet produce no hæmostatic effect in the form of pressure.

The *symptoms of intraperitoneal rupture* are those characteristic of internal hæmorrhage. The patient complains of a sudden feeling "as if something had given way"; this is followed by general pallor and faintness; the voice is reduced to a mere whisper; sighing respiration; depression of temperature; rapid and feeble pulse; usually vomiting; and in some cases death ensues in a few hours. Should the patient recover from the shock, she will sometimes state that she suspected herself to be pregnant.

The symptoms of rupture are often accompanied by hæmorrhage from the vagina, and shreds of decidua will be passed, so that the case resembles in many points, and is occasionally mistaken for, early uterine abortion. Error in such circumstances may be avoided by examining the shreds discharged from the uterus; if they are found to be chorionic villi, the pregnancy is clearly uterine.

The rapidity with which the rupture of a gravid tube will sometimes destroy life has caused more than one writer to describe this accident as "one of the most dreadful calamities to which women can be subjected"; indeed, it may be so rapidly fatal that many cases have been recorded in which death has been attributed to poisoning until dissection, instituted in many instances by the coroner, has revealed the cause of death.

In extraperitoneal rupture—that is, when the tube bursts so that the blood is extravasated between the layers of the mesometrium—the symptoms resemble intraperitoneal rupture, but, as a rule, are not so severe, and the signs of shock pass off quicker. On examining by the vagina, a round, ill-defined swelling will be detected on one side of the uterus; when the effused blood is large in amount the uterus will be pushed to the opposite side. When the bleeding takes place into the left mesometrium (broad ligament), it will sometimes extend backward under the peritoneum, and invade the connective tissue around the rectum, so that when the exploring finger is introduced into the rectum a semicircle—sometimes a ring—of swollen tissue will be found encircling the gut.

The escape of decidual membrane from the uterus accompanied by blood is also an important and fairly constant sign. Occasionally it will be necessary to pass a sound into the uterus; when the tube is gravid, the cavity of this organ will be found slightly enlarged, and the os invariably patulous.

The greatest difficulty in these cases is to be sure that the rupture is purely extraperitoneal. In a few cases the rupture may involve the peritoneal as well as the mesometric segment of the tube.

Abortion or rupture of a gravid tube is often simulated by lesions of other abdominal organs; for example:

Perforation of stomach or intestine;
Sloughing of the vermiform appendix;
Bursting of a pyosalpinx;
Intestinal obstruction (acute);
Renal colic;
Biliary colic;
Axial rotation of an ovarian tumour (acute);
Strangulated hernia; and the embryo from a tubal pregnancy which had burst has been found in the sac of an inguinal hernia.

3. **From the Date of Rupture to Term.**—Not infrequently after primary extraperitoneal rupture the symptoms of shock pass off, and the embryo continues its development; in many instances the patients believe themselves pregnant, and the hæmorrhages from which they suffer and the signs indicative of the primary rupture may merely cause temporary inconvenience. As the embryo increases in size, the abdomen enlarges, but differs at first from ordinary uterine gestation in that the enlargement is lateral instead of median.

From the third month onward the leading signs of tubal gestation may be summarized thus:

(*a*) Amenorrhœa is occasionally found; frequently there is hæmorrhage from the uterus occurring at irregular intervals, accompanied by the escape of decidual membrane. This last is a valuable diagnostic sign. It is even more valuable if the patient has missed one or two periods.

(*b*) There may or may not be milk in the breasts. Its presence is a valuable indication. From its absence nothing can be inferred.

(*c*) The uterus is slightly enlarged; the cervix usually soft, as in normal pregnancy, and the os patulous.

(*d*) A large and gradually increasing swelling to one side and behind the uterus. Occasionally the fœtal heart can be heard, and in advanced cases the outlines of the fœtus may be distinguished.

(*e*) When a woman in whom the existence of tubal gestation is suspected is suddenly seized with collapse and all the signs of internal bleeding, it is indicative of rupture of the gestation sac.

(*f*) Tubal pregnancy is very apt to occur after long intervals of sterility, and may occur as a first pregnancy even in the recently married.

4. **At Term.**—In spite of all the risks besetting the life of an extra-uterine child and that of its mother, the

pregnancy may go to term. Then a remarkable series of events ensue :

(*a*) Paroxysmal pains come on, resembling those of natural labour, accompanied by a discharge of blood and mucus, and dilatation of the os.

(*b*) This unavailing labour may last for hours or weeks.

(*c*) The mammæ may secrete milk for several weeks.

These signs sometimes pass away, and as the amniotic fluid is absorbed the abdominal swelling subsides. Months or years later suppuration takes place in the sac, and fœtal tissues may be discharged through the belly-wall, rectum, vagina, bladder, etc., and give a clue to the character of the abscess.

Various conditions may complicate the diagnosis of tubal pregnancy, thus :

1. Uterine and tubal pregnancy are sometimes concurrent;
2. Uterine sometimes follows tubal pregnancy ;
3. Tubal pregnancy may be bilateral ;
4. Tubal pregnancy may be repeated.

The remainder of this chapter is devoted to the consideration of these four complications.

It is also important to bear in mind that tubal pregnancy may be simulated by a variety of conditions :

1. Uterine pregnancy, especially where the walls of the pregnant uterus are unusually thin, allowing the fœtus to be felt with uncommon distinctness ;
2. Pregnancy in a bicorned uterus ;
3. Retroversion of the gravid uterus ;
4. Spurious pregnancy ;
5. Ovarian tumours ;
6. Tumours of the mesometrium ;
7. Uterine fibroids ;
8. Fæces in the rectum ;
9. Tubal pregnancy and fibroids, though a rare combination, has been recorded (Cullingworth, Dawson).

10. Tubal pregnancy, ovarian or parovarian cysts is not an uncommon combination ;
11. *A gravid Fallopian tube often simulates a uterine fibroid.*
12. Pregnancy in a rudimentary uterine cornu often simulates a fibroid.

Differential Diagnosis.—The diagnosis of extra-uterine pregnancy is nearly always beset with anxiety, and this especially is intensified when complications exist ; and some of the most important as well as the most peculiarly puzzling conditions are those due to variations in pregnancy, whether in the tubes or in the uterus, or in both situations at the same time. Successful uterine pregnancy subsequent to tubal gestation is by no means rare. It is therefore well to remember the following sets of conditions :

1. Tubal pregnancy may be repeated ;
2. Tubal pregnancy may be bilateral ;
3. Uterine and tubal pregnancy may be concurrent ;
4. Pregnancy may ensue on the sequestration of a full-grown extra-uterine fœtus.

Repeated Tubal Pregnancy.—In 1885 Lawson Tait operated on a woman twenty-five years of age and removed a gestation sac with the fœtus and placenta from the right side of the pelvis. This woman recovered, and eighteen months later was confined at term. Fifteen months after delivery she again conceived, and when, according to her reckoning, she had advanced to the fourth month, she was seized with severe abdominal pain and died in five hours. At the post-mortem examination a tubo-uterine gestation was found on the left side. Since this date a number of examples of this double accident have been recorded, and on evidence equally secure. It is also remarkable that in some of the patients the second tube became pregnant within a few weeks of their recovery from the operation necessitated by the conception in its fellow.

With our present knowledge it may be stated that the period of liability to repeated tubal pregnancy may vary from seven weeks to nine years, but the greater proportion of the cases fall within a limit of four years from the date of the first tube becoming gravid. This conclusion is well borne out by a study of Vassmer's painstaking analysis of 132 cases of repeated tubal pregnancy. From a careful study of available records we think the liability to repeated tubal pregnancy may be estimated at 5 per cent.

It also seems probable, but it has by no means been established as a fact, that a woman may conceive in a Fallopian tube and abortion occur at an early date without causing the patient much distress, and she may subsequently conceive in the same tube.

Bilateral Tubal Pregnancy.—In the preceding section it was shown that pregnancy may occur in one tube and at a subsequent date in the other. This is in a sense bilateral tubal pregnancy, but it is better to limit the term to the condition where a tubal pregnancy is progressing in each tube at the same time.

There is no indisputable example of this on record, but a number of cases have been reported in which two gravid tubes have been removed from a patient at the same operation, but a critical examination has shown them to be of different dates, and that one of them is progressing, whereas the other is old and quiescent. Such are, as a matter of fact, examples of repeated tubal pregnancy.

The question of bilateral simultaneous tubal conception will remain unsettled in many minds until a case is found in which the two embryos are living and of the same age. It is probably the rarest of all varieties or combinations of tubal pregnancy.

Concurrent Uterine and Tubal Pregnancy.—This condition requires consideration in three sections :

(*a*) A tubal and a uterine pregnancy occur simultaneously ;

the complication is recognised in the early months, and terminated by surgical intervention.

(*b*) Intra- and extra-uterine pregnancy with living fœtuses run concurrently to term (compound pregnancy).

(*c*) Cases in which uterine pregnancy is complicated by the presence in the pelvis of a quiescent (sequestered) extra-uterine fœtus.

Tubal and uterine pregnancy coexist, but the complication is recognised in the early stages.

It is now established by many carefully-recorded cases that pregnancy may coexist in the Fallopian tube and uterus, but the tubal oösperm becomes converted into a mole, and whilst the uterine oösperm continues its normal development, its tubal companion may cause trouble by inducing rupture of the tube or tubal abortion. The period at which these accidents arise in the course of the pregnancy varies greatly. In some of the cases the catastrophe to the tubal pregnancy arises so early after fertilization that the intra-uterine pregnancy is not recognised at first, the enlargement of the uterus being attributed to the coincident formation of the decidua. The true condition is revealed in the subsequent course of the case, or is discovered at the operation (Boyd, Zincke, Simpson, Strauss, etc.). In some instances the conversion of the tubal oösperm into a mole has occurred so quietly that its presence has not been suspected until after miscarriage of the uterine pregnancy, then a swelling has been recognised in the pelvis, and its nature determined in the course of an operation (Phillips).

Uterine and extra-uterine pregnancy running concurrently to term.

It is too true that uterine and tubal pregnancy may run concurrently and both go to term; this may be described as the most dangerous combination to which child-bearing-women are liable.

Pregnancy and Sequestered Extra-uterine Fœtus.—In this combination a woman has had an extra-uterine pregnancy which may even go to term; the fœtus dies and remains sequestered in the pelvis. The nature of the case is forgotten, and the woman may subsequently conceive in the uterus. Even in these circumstances there is reason to believe that the child has been safely delivered, and repeated pregnancies have followed (Leopold). In some instances, however, the sequestered fœtus constituted a dangerous barrier. In one instructive case the entombed extra-uterine fœtus was extracted by cœliotomy and the mother recovered (Worrall).

CHAPTER XXXVI

TUBAL PREGNANCY—(*Continued*)

TREATMENT.

THE treatment of extra-uterine gestation is of two kinds, expectant and operative.

Expectant Treatment.—This is only possible in the early stages of tubal pregnancy, and is a survival of the period when collections of blood in the female pelvis were commonly called hæmatoceles, and their causes ill-understood; it was then the custom to keep women with intra-pelvic hæmorrhage at rest in bed for many weeks, in some cases many months, till the blood was absorbed. In some patients suppuration occurred, and the pus discharged itself through the rectum, vagina, bladder, or slowly through the abdominal wall, the final evacuation being occasionally hastened by the scalpel. Some practitioners advocate this mode of treatment at the present time. It is undeniable that with absolute rest in bed a very large effusion of blood will be slowly absorbed; at the same time no one will deny that acute symptoms, indicated by rapidity of pulse, a high temperature, and occasionally by toxic symptoms, arise from the absorption of liquefying non-septic clot. Many cases, too, have been reported to show that a deliquescent mole in a Fallopian tube is apt to be a very troublesome body quite apart from its tendency to provoke recurrent bleeding from the tube. Further, many patients who have been treated on the expectant plan, and who have been regarded as cured, have subsequently come under the care of surgeons for operative treatment. In some of these a liquefying mole has been found, and in others a large encysted collection of sanguineous fluid.

On the whole, it may be fairly stated that probably many gravid tubes rupture or abort, especially the latter, and cause the patient no more than a moderate amount of disturbance, which rest will cure. There remains, however, a very large number in which operation is directly needed to save the patient from bleeding to death. In a fair proportion of cases it can be said that though life was not directly imperilled, operative interference was nevertheless directly serviceable in reducing convalescence from several months to a few weeks.

Operative Treatment.—The risks and difficulties of operations for tubal pregnancy depend mainly on the stage at which they are required :

1. **Before Primary Rupture or Abortion.**—In this stage the operation required is practically that of oöphorectomy.

2. **At the Time of Primary Rupture or Abortion.**—When the symptoms of hæmorrhage are unmistakable and the patient's life in grave danger, cœliotomy should be performed without delay, unless there is good evidence that the rupture is extraperitoneal. The employment of this method is in strict accordance with the canon of surgery, valid in other regions of the body—viz., arrest hæmorrhage at the earliest possible moment.

There are few accidents that test the skill, nerve, and resource of a surgeon more than cœliotomy for a suspected intraperitoneal rupture of a gravid tube, and few operations are followed by such brilliant results.

The method of performing the operation before, and at the time of, primary rupture is identical with oöphorectomy.

Occasionally the rent in the tube will involve the fundus of the uterus, especially when the embryo is lodged near the uterus. Such rents should be carefully sutured with silk.

3. **Subsequent to Primary Rupture.**—The majority of cases are submitted to operation at periods varying from a few days to weeks, or even months, after the tube has ruptured. (It has been already pointed out that in an exceedingly large proportion of cases the tube is occupied by a mole.)

When the tube ruptures, the hæmorrhage may not be so profuse as to induce death; and the woman, recovering from the shock, does not manifest such grave symptoms as to demand surgical aid. The consequence is that the patient remains for several weeks under palliative treatment (unless a renewal of bleeding kills her), and at last she seeks surgical advice. Appreciation of the true nature of the case leads to operation.

In such cases, when the abdomen is opened, the free blood in the abdominal cavity is easily removed by sterilized dabs of absorbent material. The damaged tube and ovary are removed as in oöphorectomy. When there is much free blood care must be taken that no clots are left in the iliac fossæ. When the blood has remained in the cœlom for several weeks after rupture, it is judicious to insert a thin gauze drain for a few days.

In operations for the removal of a gravid Fallopian tube it has been suggested that the opposite tube should be removed in order to protect the patient against the recurrence of the accident; but men of sound judgment and ripe experience are averse to such a proceeding, for it is an established fact that uterine pregnancy is not uncommon after unilateral tubal pregnancy. Our experience is in harmony with this.

Colpotomy.—Quite a large number of successful cases have been recorded in which the mole and clot have been removed from the pelvis by posterior colpotomy. The recovery is usually speedy, and avoids the risk of a yielding abdominal scar.

4. **Mesometric Gestation.**—When a Fallopian tube bursts, and a mole is displaced between the layers of the mesometrium, operative interference is rarely necessary. Occasionally repeated hæmorrhage renders it imperative to incise the abdominal wall, open the mesometrium, and turn out the clot, and, after stitching the sac to the edges of the wound, allow it to gradually close.

In those cases where the embryo survives the primary rupture and continues to grow an operation may be necessary at any moment on account of secondary rupture. When gestation has not advanced beyond the fourth month, it may be possible to remove the embryo, tube, ovary, and adjacent portion of the mesometrium with the placenta, and to thoroughly clear away all clots. When it has advanced beyond the fourth month, the placenta is too large to be treated in such a summary manner. Certainly after the fifth month operative measures for tubal gestation require consideration under two headings:

1. The treatment of the sac;
2. The treatment of the placenta.

1. **The Treatment of the Sac.**—The gestation sac in the last stages of tubal pregnancy consists of the remnants of the expanded tube and the mesometrium, which may be thickened in some parts and expanded in others. To the walls of the sac coils of intestine and omentum usually adhere.

Experience has decided clearly enough that the safest plan is to incise the sac, remove the fœtus, and stitch the edges of the sac to the abdominal wound, precisely as in the plan recommended after enucleating large cysts and tumours from between the layers of the mesometrium.

In those rare cases where the amnion erodes the tube and invades the belly (ventral pregnancy), the gestation sac, with its contents has been successfully removed by merely transfixing its base with silk ligatures.

2. **The Treatment of the Placenta.**—The rules for the treatment of the placenta may be formulated thus:

(1) When the placenta is situated above the fœtus, it is good practice to attempt its removal.

(2) In some instances the placenta becomes detached in the course of the operation, and leaves no choice.

(3) When the placenta is below the fœtus, it may be left.

(4) Should the placenta be left, the sac closed, and symptoms of suppuration occur, then the wound must be reopened and the placenta removed.

(5) If the fœtus dies some weeks before the operation is attempted, the placenta can be removed with little risk of hæmorrhage.

The great risk of violent hæmorrhage renders an operation for tubal pregnancy with a quick placenta, between the fifth and ninth months of gestation, the most dangerous in the whole range of surgery. About two-thirds of the patients die. There are three great dangers—hæmorrhage, shock, and peritonitis, due to decomposition of the placenta when it has been left to slough; hence it cannot be urged with too much force that when it is fairly evident that a woman has a tubal pregnancy it should be dealt with by operation without delay, and our experience of the operation leads us to believe that it is a wise plan to remove the placenta at the primary operation.

After Death of the Fœtus at or near Term.—Operations after the death of the fœtus are less complicated than when it is alive, and the placental circulation in full vigour. Not only is the proceeding from the operative point of view simplified, but the results, in so far as the mother is concerned, are much more satisfactory. Even when the fœtus is dead, we have no precise facts to guide us in determining when the placental circulation ceases. In some cases it has been found active when the fœtus has been probably dead six weeks.

When the operation is undertaken in cases where the fœtus is in the condition of lithopædion the procedure is very simple, because the placenta has completely disappeared. When the fœtus is converted into adipocere, the fœtal tissues adhere to the walls of the sac and render the process of removal tedious.

After Decomposition of the Fœtus and Suppuration of the Sac.—After death and decomposition of the fœtus, sinuses form by which pus, accompanied by fragments of fœtal tissue and bones, finds an exit, either through the rectum, vagina, bladder, or uterus, or at some spot in the anterior abdominal wall below the umbilicus. The treatment in such cases is simplicity itself. The sinuses should be dilated and all fragments removed from the cavity in which they lie. When this is thoroughly done, the sinuses will rapidly granulate and close. Partial operations are useless; if only a portion of a bone is allowed to remain, a troublesome sinus persists.

The difficulties and grave dangers which surround surgical intervention in the late stages of tubal pregnancy make it clear that the interests of a patient are best served when the surgeon removes a gravid tube as soon as it is clearly recognised.

Hysterectomy in Cases of Extra-uterine Pregnancy.—It is occasionally necessary in operating for the various forms of extra-uterine gestation to remove the uterus in order to control the hæmorrhage. This severe measure has been performed in dealing with interstitial and with cornual pregnancy. In the tubal variety it may be necessary when the tissues in the mesometrium have been extensively torn up by hæmorrhage.

Results of Operative Treatment.—In order to afford some notion of the risks attending the surgical treatment of extra-uterine gestation, as well as to give an idea of its relative frequency in hospital practice, the following figures will serve. From 1896 to 1904, both years inclusive, eighty-two operations for this condition were performed in the Chelsea Hospital for Women. During these ten years all the varieties of tubal pregnancy were met with (ampullary, isthmial, and tubo-uterine), including the rare condition of a living fœtus free among the intestines, and the more uncommon condition of a full-time cornual pregnancy. Of these eighty-two patients two died from the operation, one in 1897 and the other in 1902.

CHAPTER XXXVII

DISEASES OF THE OVARIES

AGE-CHANGES, MALFORMATIONS, DISPLACEMENTS, THE CORPUS LUTEUM, AND INFLAMMATION.

Age-changes.—The variations in the shape of the ovary from infancy to old age are very striking. At birth the ovary is an elongated body, resembling in shape a miniature but somewhat flattened cucumber, lying parallel with the Fallopian tube; not infrequently its borders are crenate, and occasionally it is traversed by a longitudinal furrow. The infantile form of the ovary gradually changes, and at puberty it has become transformed into the smooth, olive-shaped gland indicative of the mature woman. From the accession of puberty until the forty-fifth year the general contour of the ovary remains undisturbed, but the smoothness of its surface is marred by scars, the effects of repeated lacerations caused by the rupture of ripe follicles. The actual size of the gland varies according to the individual; on an average it measures in length 4 centimetres, transversely 2·5 centimetres, and is about 1·2 centimetres thick. Its average weight is 6 grammes. The two ovaries are rarely equal in size.

From the age of forty-five onward the ovaries diminish in size. This alteration is accompanied by arrest of menstruation. As the gland shrinks, its surface becomes irregular, and is often marked by deep wrinkles. At the same time profound alterations are in progress within the gland, for the ova and their follicles gradually disappear, and in advanced life nothing is left but a corrugated body consisting of fibrous tissue traversed by a few bloodvessels with thickened (sclerosed) walls. An ovary in a woman of seventy years weighs about 1 gramme (15 grains) —that is, one-sixth of what it probably weighed at the age of twenty. As a matter of fact the ovary is a temporary and ductless gland, its period of activity being coincident with menstrual life—the incidence of which we term puberty, and its natural termination the menopause.

The periods of life mentioned above for the supervention of age-changes are very arbitrary, and in some women they occur much earlier, and may still be regarded as physiological. But when the ovaries are small and puckered early in the sexual period of woman's life (thirtieth year), the condition is described as pathological, and the ovary is said to be atrophied. It is very difficult to estimate from a naked-eye examination of an ovary its ova-forming value. Many women with small ovaries have had large families, whilst others with sexual glands of twice or thrice their dimensions remain sterile in spite of every effort to become mothers.

Malformations.—The ovaries, like other organs, are liable to irregularities in their development.

Congenital absence of both ovaries is rare, and is associated with defective development of the uterus. Absence of one ovary usually accompanies deficiency of the corresponding half of the uterus and the Fallopian tube, and absence or misplacement of the corresponding kidney. In the malformed condition of the uterus known as " unicorn uterus " the ovary often retains its infantile (cucumber-like) shape.

Supernumerary or accessory ovaries are mentioned by some writers as of common occurrence. A careful consideration of the evidence makes it clear that small pedunculated bodies near the ovary are very frequent, but they are not accessory ovaries. Many of them are partially detached tubes of the parovarium, stalked corpora fibrosa, or small myomata of the ovarian ligament.

So far as the facts at present stand a supernumerary ovary, so separated from the main gland as to form a distinct ovary, has yet to be described by a competent observer.

Displacements.—Under this heading it will be necessary to consider three conditions: Undescended ovary; hernia of the ovary; prolapse of the ovary.

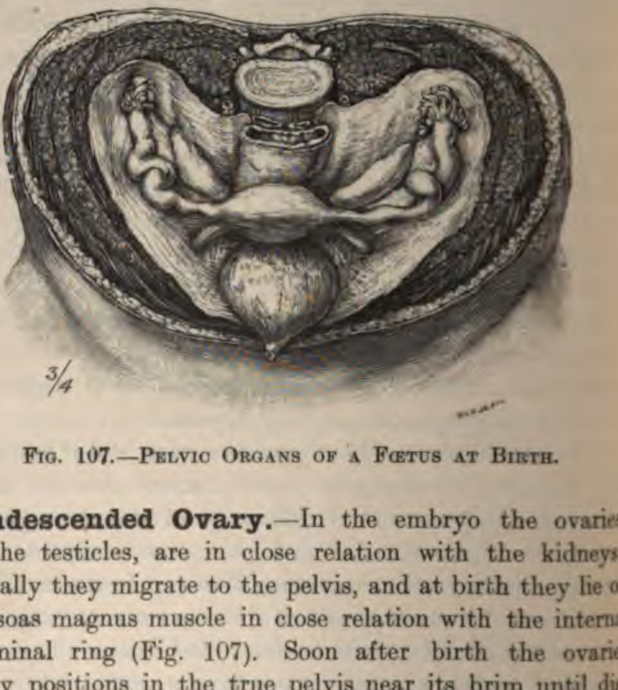


FIG. 107.—PELVIC ORGANS OF A FŒTUS AT BIRTH.

Undescended Ovary.—In the embryo the ovaries, like the testicles, are in close relation with the kidneys; gradually they migrate to the pelvis, and at birth they lie on the psoas magnus muscle in close relation with the internal abdominal ring (Fig. 107). Soon after birth the ovaries occupy positions in the true pelvis near its brim until disturbed by accident or pregnancy.

In very rare instances an ovary remains in the neighbourhood of the kidney or in some position between the kidney and the brim of the true pelvis. In such a case it retains the infantile shape. In a certain proportion of cases of undescended testis on the right side the cæcum fails to descend to its normal position in the right iliac fossa. Retention of the right ovary in the loin is associated with a similar disposition of the cæcum.

Hernia of the Ovary.—An ovary may occupy a hernial sac either alone or in company with the Fallopian tube, omentum, intestine, etc.; most frequently it occupies a sac in the inguinal region, less frequently in the femoral. It has been found herniated through the obturator foramen (Rogner-Gusenthal).

Following the method adopted with other varieties of hernia when the ovary alone occupies a hernial sac, it may be termed an *oöphorocele;* when accompanied by the tube a *salpingo-oöphorocele;* hernia of the tube alone is called a *salpingocele.*

Oöphoroceles may occur in the early months of infancy, but congenital hernia of the ovary is excessively rare. Many writers on hernia refer to it as a common condition; hence it is necessary to point out that the rounded, movable bodies so frequent in the inguinal canals of female infants are in most cases hydroceles of the canal of Nuck. As a rule they disappear.

Hernia of the ovary may occur at any age; it has been observed as early as the third month, and as late as the seventy-third year.

Salpingocele.—Hernia of the Fallopian tube alone is rare; the tube may occupy the inguinal or the femoral canal. The tube has been found in the inguinal canal of an infant, but salpingoceles are very rare before the thirtieth year. The tube is occasionally found in the sac of a hernia associated with bowel, omentum, or bladder. In one remarkable case the right Fallopian tube was found in the sac of an obturator hernia in a woman seventy-eight years of age (Gladstone).

A strangulated oöphorocele or salpingocele gives rise to signs such as characterize epiploceles or enteroceles. The signs of strangulation sometimes depend on axial rotation (torsion) of the herniated ovary and tube.

The fundus of the uterus, as well as the ovary and tube, has been found in an inguinal sac, and several cases have been reported in which a pregnant uterus with its appendages has occupied a sac protruding through the inguinal canal.

In all cases in which a supposed ovary is removed from the inguinal region its nature should be substantiated by the microscope; in many instances bodies excised in this way have on microscopic examination turned out to be testes, and the supposed women pseudo-hermaphrodites (see p. 58).

Treatment.—Herniated ovaries and tubes require removal when they are a source of pain, and in women who cannot wear a truss. The operation has been almost entirely confined to those who have to maintain themselves by hard work. The operation is performed as for inguinal hernia: the pedicle is secured with silk, the ovary and tube cut away, and the stump returned into the cœlom. The sac is dissected out, and its neck secured with sterilized silk. When herniated ovaries or tubes become strangulated or undergo axial rotation (torsion) operation is the only choice, as the urgent symptoms are rarely likely to be differentiated from those which arise from strangulation of herniated intestine.

Prolapse of the Ovary.—At puberty the ovaries lie parallel to, and on a level with, the brim of the pelvis. From this position they are liable to be disturbed by pregnancy, retroflexion of the uterus and enlargement.

Pregnancy.—The alteration in the size of the uterus during pregnancy, and the stretching to which the pelvic peritoneum, Fallopian tubes, and ovarian ligaments are subjected, cause them, especially if pregnancy be frequently repeated, to become very lax. Under these conditions one or other ovary, instead of retaining its usual position at the brim of the true pelvis, may drop upon, or near, the floor of the recto-vaginal pouch. When the left ovary is thus displaced, it lies between the upper part of the vagina and the rectum.

An ovary thus displaced is said to be prolapsed, and not infrequently is a source of much pain and distress, for it becomes pressed upon during defæcation, and patients complain of the severe pain they experience during sexual congress (dyspareunia).

Retroflexion of the Uterus.—In this misplacement the ovaries are often drawn into the pelvis. When one or both ovaries lie on the floor of the recto-vaginal fossa, with the body of the uterus resting on them, they become painful; the rolling movement which the uterus exercises on the ovaries in this position will sometimes cause them to be covered with a thick layer of fibrous tissue, resembling the familiar white patch on the anterior surface of the heart.

Enlarged Ovary.—When an ovary is enlarged from the presence of a tumour of moderate dimensions its weight will lead to stretching of the ovarian ligament, and it will fall with the associated structures into the recto-vaginal pouch. A small parovarian cyst will act in a similar way.

Diagnosis.—On vaginal examination a small rounded or elongated body will be found low in the recto-vaginal fossa, and usually on the left side. The frequency with which prolapsed ovaries occupy this side is due to the fact that the fossa is deeper on the left than on the right side. On touching the ovary, the patient winces and complains of pain. These painful sensations are most acute when the ovary is touched, but they are often evoked when the neck of the uterus is pressed, because the ovary is then squeezed between the uterus and the rectum.

Treatment.—When prolapse of the ovary depends on retroflexion of the uterus, it is usually relieved by rectifying the malposition of the fundus, and maintaining it in the normal position by a pessary. In troublesome cases it is better to perform hysteropexy. When the prolapse is due to the presence of a cyst or tumour, then ovariotomy is the most appropriate method of treatment.

The Corpus Luteum.—This curious body is liable to the following secondary changes: it may be converted into a cyst, become a corpus fibrosum, or calcify.

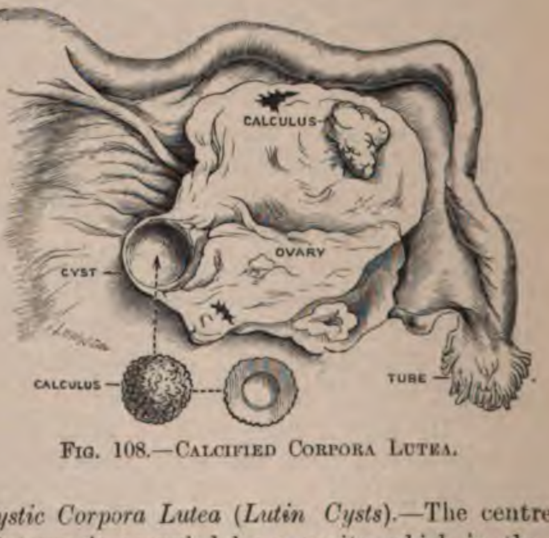


FIG. 108.—CALCIFIED CORPORA LUTEA.

(*a*) *Cystic Corpora Lutea* (*Lutin Cysts*).—The centre of a corpus luteum is occupied by a cavity which in the early stages is filled with blood. The walls of such cysts are thick, and of a bright yellow when fresh; the cavity is lined with a thin delicate membrane and filled with albuminous fluid. The importance of these cysts is discussed in Chapter XXIX.

(*b*) *Corpora Fibrosa.*—These are tough, semi-opaque bodies, and are due to fibrous changes in the tissue proper of a corpus luteum. Many contain a small central cavity, others a laminated body. Less frequently they become calcified. Sometimes a corpus fibrosum is pedunculated, and is then apt to be regarded as a supernumerary ovary. Corpora fibrosa may attain the dimensions of a hen's egg (Patenko).

Ovarian Concretions.—In very rare instances blood effused into enlarged ovarian follicles may undergo colloid changes, and form dense bean-shaped bodies.

(*c*) *Calcified Corpora Lutea.*—When calcified, a corpus luteum may be irregular in shape or rounded; it is usually a bright yellow, and consists of tough fibrous tissue impregnated with calcareous particles.

These bodies are usually firmly embedded in the ovarian stroma; the concretion may be nodulated on its outer surface like a mulberry calculus, and lodged in a cyst in the substance of the ovary. Two calcified corpora lutea may be present in one ovary (Fig. 108); they must not be confounded with calcified corpora fibrosa.

Apoplexy of the Ovary.—The rupture of a mature ovarian follicle is always accompanied by a trifling amount of bleeding; when a follicle is unusually large, the blood-clot occupying it may be as big as a ripe gooseberry. Follicular hæmorrhage of this character rarely gives rise to any serious consequences.

Occasionally blood is extravasated so freely into a follicle that it bursts the walls and invades the stroma, converting the organ into a spurious cyst, the walls of which are formed of expanded ovarian tissue and the cavity filled with blood.

For such conditions the term "apoplexy of the ovary" should be reserved. It may be defined as *hæmorrhage into the ovarian stroma through rupture of a follicle* (Doran). Cases have been reported in which the ovary has been enlarged from this cause to the size of a billiard-ball.

Cases of this kind will in future require careful investigation, for some may prove to be instances of early ovarian pregnancy (see Chapter XXXII.).

Blood extravasated into the ovarian stroma undergoes the same change as when it escapes into other solid organs; that is, the fluid parts are absorbed, and the clot gradually becomes decolourized until nothing but a yellowish mass of fibrin remains. Occasionally it will be of a dirty brown, resembling that found in an old hæmatocele of the tunica vaginalis testis.

Extravasation of blood in the ovarian stroma occurs when the ovary undergoes axial rotation.

Care must be exercised to avoid confounding apoplexy of the ovary with hæmorrhage into the cavity of a small ovarian cyst, or extravasation secondary to axial rotation of an enlarged ovary.

Inflammation of the Ovary (Oöphoritis).—Acute and chronic inflammatory diseases of the ovaries are so constantly associated with salpingitis, to which they are in nearly all cases secondary, that they were considered in Chapter XXX.

There are several conditions which it will be necessary to briefly discuss here. They are: (1) Oöphoritis secondary to parotitis (mumps); (2) tuberculosis of the ovary; (3) abscess of the ovary.

1. *Oöphoritis and Parotitis.*—Girls and young women during an attack of mumps occasionally complain of pelvic pain. In a few cases, where the suffering has been sufficiently severe to warrant a vaginal examination, the ovaries have been found enlarged, tender, and painful. As a rule, the ovaries are affected during the subsidence of mumps. In a few exceptional cases the pelvic pain has preceded the parotid signs.

In this connection it is important to bear in mind that parotitis is not infrequently a sequel to injuries or operations upon abdominal and pelvic viscera, but in these conditions the gland often suppurates.

At present there is no explanation forthcoming of the relation of oöphoritis and orchitis as sequelæ of mumps : the whole of the evidence rests on clinical observation.

2. *Tuberculosis of the Ovary.*—This disease may attack the ovary in the form of small miliary nodules limited to its surface (as a rule, it is then part of a general peritoneal tuberculosis), or it may occur as a collection of caseous pus in the substance of the gland, and is then secondary to tubercular salpingitis (see Chapter XXX.).

3. *Abscess of the Ovary.*—Suppuration in the ovary is in the majority of cases secondary to salpingitis. Abscess of the ovary, apart from tubal infection, may occur in patients with tubercular lesions in other organs.

In one unusual case an ovarian abscess occurring in a woman twenty-one years of age contained a piece of sewing-needle 2 centimetres long (Haviland).

Treatment.—The clinical features of ovarian inflammation are so bound up with those of pyosalpinx and its complications that the details will be found in Chapter XXXI.

Perioöphoritis.—Chronic inflammation in the pelvis in the immediate neighbourhood of the ovary is almost sure to involve this gland. Thus, after pelvic peritonitis and pelvic cellulitis the superficial parts of the ovary are infiltrated and adhere to surrounding structures. As the inflammatory products organize, the ovary becomes imbedded in tissue almost as dense as that of a cicatrix.

Perioöphoritis is said to occur as a sequel to typhoid fever, rheumatism, the exanthemata, and chronic alcoholism. It is occasionally seen as a consequence of ascites.

The most important results of perioöphoritis are painful menstruation (dysmenorrhœa) and sterility.

Cirrhosis of the Ovaries.—Ovaries are occasionally met with in women between twenty and forty years of age presenting a peculiar wrinkled appearance. Such ovaries are said to be cirrhotic, because the ultimate effect upon the proper tissue of the ovary is similar to that seen in hepatic, renal, and pulmonary cirrhosis—that is, destruction of the proper tissue of the liver, kidney, or lung, as the case may be. The great difference in fibrosis of the ovary, as compared with this change in other organs, is that in the ovary the connective tissue of the stroma shows no evidence of inflammation. In a cirrhotic liver the interstitial tissue is infiltrated with small round cells, but in the cirrhotic ovaries this is not the case, even when this change occurs in the ovaries of a woman who has also a cirrhotic liver.

The changes described as cirrhosis or fibrosis of the ovaries, occurring in women between twenty and forty years of age, require investigation. Even the cause or causes producing the change are imperfectly understood.

Ovarian Neuralgia.—Under this term it is usual to consider a group of symptoms consisting mainly of pain in the pelvic and subumbilical regions; whilst, on the most careful physical examination, nothing abnormal can be detected in the pelvis to account for the painful symptoms.

Many of the patients are single, highly neurotic, and complain of the *globus hystericus*; some are highly religious, and therefore emotional. Others may be highly educated, intellectual, and interested in the "fine arts." Unfortunately, a large proportion of these patients are addicted to two vices—alcoholism and masturbation.

The troubles do not arise before puberty, but may occur at any period during sexual life, and in some the symptoms are markedly accentuated at the menopause.

The patient complains of pain in one or both iliac fossæ; it is often increased by the pressure of the clothes, by walking, riding, or exercise in any form; some patients remain confined to bed for weeks and even months, and some actually become bedridden. With many sexual intercourse increases the pain; in nearly all the suffering is worse during menstruation.

Although these pains are often described as ovarialgia it is quite certain that the ovaries are not the source of the painful sensations, because these have in many instances continued, and even become intensified, after bilateral oöphorectomy. In some the severity of the symptoms has led surgeons to remove the uterus; even this extreme method has failed to afford an escape from the pain.

Treatment.—This is of little avail, as may be inferred from the variety of methods which have been employed.

Nothing is so prejudicial as local treatment; frequent examinations, the use of vaginal tampons, pessaries, and all kinds of electrical treatment do great harm. Change of air, employment, a happy marriage (especially if fertile), often lead to improvement.

Anodynes, such as opium, morphia, chloral, are dangerous, and above all alcohol should be strictly forbidden.

Surgical measures are equally useless, for unilateral and bilateral oöphorectomy may do good for a few months, but the almost inevitable relapse leaves the patient worse than before. Even sham oöphorectomy and vaginal hysterectomy have been tried, with the same temporary success. These patients are hopeless with physician and surgeon, singly or combined. Many become chronic alcoholics; some figure in divorce courts; others end their days in lunatic asylums.

CHAPTER XXXVIII

DISEASES OF THE OVARIES—(*Continued*)

TUMOURS, DERMOIDS AND CYSTS.

THE ovary is a somewhat complex organ histologically and morphologically, and this fact explains in a measure the extraordinary frequency and variety of the tumours which arise therein.

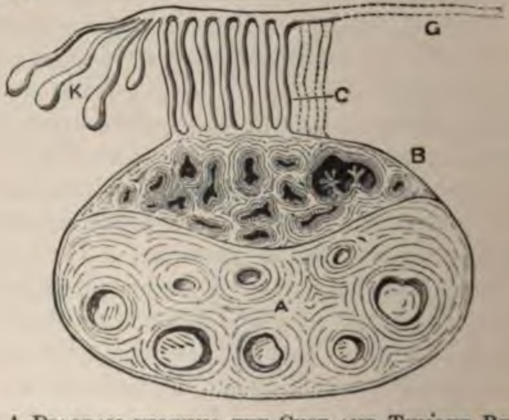


FIG. 109.—A DIAGRAM SHOWING THE CYST AND TUMOUR REGIONS OF THE OVARY.

A, Oöphoron; B, paroöphoron; C, parovarium; K, Kobelt's tubules; G, Gartner's duct.

The ovary consists morphologically of three parts:

The Oöphoron.—This forms the free surface of the ovary and contains the follicles.

The Paroöphoron.—This is sometimes called the hilum of the ovary, and consists of fibrous tissue. It never contains follicles, and in young ovaries glandular tissue, vestiges of the mesonephros (Wolffian body), may be found in it.

The Parovarium (Epoöphoron).—A tubular structure lying between the layers of the mesosalpinx. The tubules terminate in the paroöphoron, and at the opposite end open into the duct of Gartner, which may sometimes be traced to the vagina.

The tumours which arise in connection with the ovary will be described in the following order: dermoids (embryomata); lutein cysts; papillomatous cysts; fibroids; sarcomata; carcinomata; parovarian cysts.

DERMOIDS (EMBRYOMATA).

The oöphoron is the source of three varieties of tumours, known as cysts, adenomata (multilocular cysts), and dermoids (or embryomata), which in their type forms are easily distinguished; but they approach each other by such gradations as to make it difficult to draw a dividing line.

Simple Cysts.—These may be unilocular or multilocular, and arise in the ovarian follicles. In a small cyst, and in the lesser cavities of the multilocular variety, the walls are lined with epithelium, which may be columnar, cubical, or stratified, according to the size of the cyst or loculus.

In cysts containing 3 or 4 litres of fluid the walls will be found to consist entirely of fibrous tissue; no epithelium can be detected. It is impossible to state definitely the size of a cyst in which the epithelium disappears. The absence of epithelium is due to atrophic changes, the consequence of the continual pressure exerted by the accumulating field. Precisely similar changes may be studied in the mucous membrane of greatly distended gall-bladders.

An extremely simple means of determining an oöphoronic tumour is to note the relation of the Fallopian tube; it lies curled up on the cyst, and when the parts are stretched the tube and tumour are separated by the mesosalpinx.

A unilocular ovarian cyst may attain an enormous size. Probably the largest on record was removed (by Dr. Elizabeth Reifsnyder, a lady missionary at Shanghai) from a Chinese woman twenty-five years of age. The sac yielded 100 litres of fluid, and the patient recovered.

Adenomata.—These are important and interesting tumours. They possess a fibrous capsule, and internally consist of a great number of loculi, some of which will scarcely accommodate a pea, whilst others hold 1 litre or more of fluid.

The loculi in the early stages of growth are lined with tall columnar epithelium, and the walls contain mucous glands. In some tumours the lining membrane is indistinguishable from mucous membrane. The fluid contained in such loculi is identical with mucus, and it varies in consistency from that of the white of an egg to the gluey condition of jelly.

Ovarian adenomata attain enormous dimensions—30, 40, and even 50 kilogrammes.

Dermoids.—A very large proportion of cysts arising in the oöphoron contain skin or mucous membrane, or both these structures, and some of the many organs arising from and peculiar to them, such as hair, sebaceous, sweat, mucous, thyroid, and mammary glands, as well as bone, horn, nails, and teeth. Tumours of this kind are called dermoids. They may be unilocular or multilocular, and attain a weight of 20 or even 40 kilogrammes.

It is necessary to indicate how impossible it is to separate the three varieties—cysts, adenomata, and dermoids—from each other. Occasionally a tumour will come to hand displaying an internal lining of stratified epithelium, which would serve for skin or mucous membrane, yet if it possess a few hairs it is called skin, and the cyst becomes a dermoid. The contents of a dermoid usually consist of a pultaceous mixture of shed epithelium, fat, and loose hair. In many complex multilocular dermoids some of the loculi contain mucous membrane and are filled with mucus; others possess hairs, and a few may be quite barren.

It is impossible to determine in many cases from a mere naked-eye examination whether an oöphoronic tumour should be regarded as an adenoma or a dermoid. In practice the presence of a tuft of hair or a tooth is a useful and ready way of settling the question. Failing this, a careful microscopical examination is necessary.

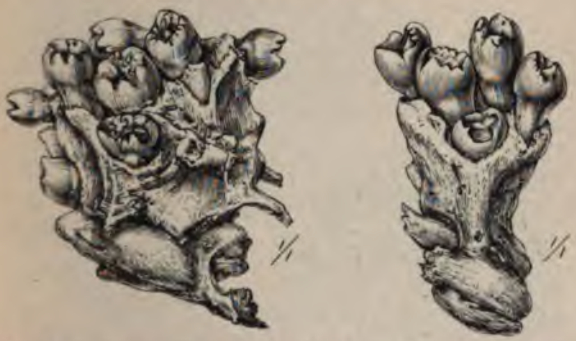


FIG. 110.—TEETH AND BONE FROM AN OVARIAN DERMOID.

Cysts of the oöphoron occur at all periods of life, and even in young girls sometimes reach a great size. Instances are known in which the tumour weighed more than the body of the patient. In one case a girl weighed 27 kilogrammes and her tumour 44 kilogrammes (Keen). Ovarian dermoids have been seen as early as the first year of life and as late as eighty-three. There is no authentic record of an ovarian dermoid in a new-born child.

Ovarian Mamma and Teats.—It is quite common to find in the interior of ovarian dermoids one or more tags of skin resembling a nipple or teat, associated with hair and teeth. These teats may be small, but usually they are conspicuous (Fig. 111). These nipple-like processes have assumed some importance since Wilms has pointed out that an ovarian dermoid presents two parts—namely, a cyst and

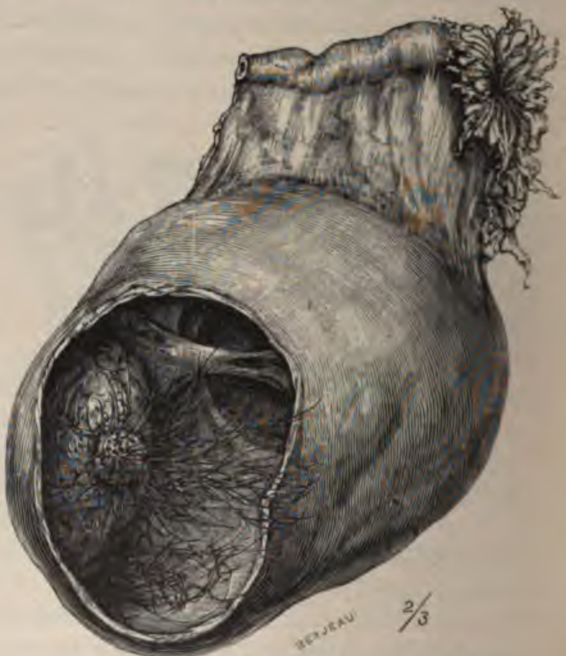


FIG. 111.—OVARIAN DERMOID.

an embryonic rudiment. The cyst is composed of fibrous tissue arranged in wavy bundles ; its inner aspect is lined with loose connective tissue, and at one part it presents a skin-covered surface of variable extent, usually beset with hair. Associated with this skin-covered surface there is an "embryonic rudiment," usually in the form of a nipple-like process: this rudiment may be inconspicuous or large and complex. These observations have led some writers to return to the old view that a dermoid in the ovary may represent an attempt to form a fœtus independent of impregnation. Apart from speculations of this kind, the more recent researches of the nature of these tumours show that some of these ovarian embryomata in children display malignancy.

Cases have been observed and carefully recorded in which these tumours have disseminated in the peritoneum, and the secondary nodules contained cartilage, epithelial pearls, hair, and even nerve cells.

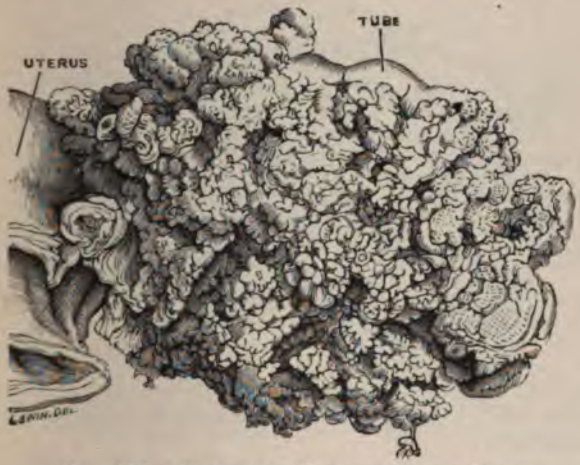


FIG. 112.—RUPTURED PAPILLOMATOUS CYST.

Left half of the specimen. (Museum of the Royal College of Surgeons. From Bland-Sutton's work "On Tumours.")

Lutein Cysts.—These are described in Chapter XXIX.

The Paroöphoron.—The tissues composing the hilum of the ovary have been the subject of much careful histologic investigation, and are believed by some writers to be the source of papillomatous cysts.

Papillomatous Cysts.—These differ from simple cysts of the ovary in the fact that they are invariably unilocular and their inner walls are beset with warts (papillomata) (Fig. 112).

These cysts do not affect the shape of the ovary until they have attained an important size; they always burrow between the layers of the mesosalpinx, and, when large, make their way between the layers of the mesometrium by the side of the uterus. Papillomatous cysts are most frequent between the twenty-fifth and fiftieth years, and are usually bilateral. The warts vary greatly in number. Some cysts contain but few; in others they are so luxuriant as to cause the cyst to burst; the warts then protrude as soft dendritic vascular masses, and the surface cells become detached and engraft themselves on the peritoneum, and form secondary warts. This accident is usually followed by hydroperitoneum.

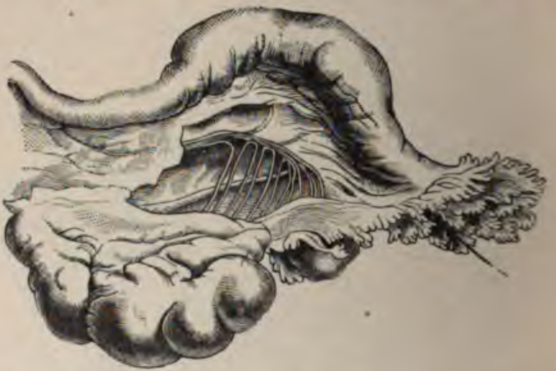


FIG. 113.—THE OVARY, FALLOPIAN TUBE, AND THE MESOSALPINX, WITH ITS POSTERIOR LAYER REMOVED TO DISPLAY THE PAROVARIUM.

Natural size, from a woman of forty years. (From Bland-Sutton's work on "Diseases of the Ovaries and Tubes.")

Parovarian Cysts.—The cysts which arise in the parovarium (Fig. 113) are of two kinds. The most frequent are small pedunculated cysts arising in Kobelt's tubes; they are of no clinical interest. The most important cysts are sessile and remain between the layers of the mesosalpinx. When the cyst is large, the Fallopian tube is stretched across its crown (Fig. 114).

Small parovarian cysts are, as a rule, transparent, but when they exceed the size of a cocoanut the cyst-walls become thick and opaque. Small cysts are lined with columnar epithelium, which is sometimes ciliated; in cysts of moderate size the epithelium becomes stratified, and in large cysts it disappears.

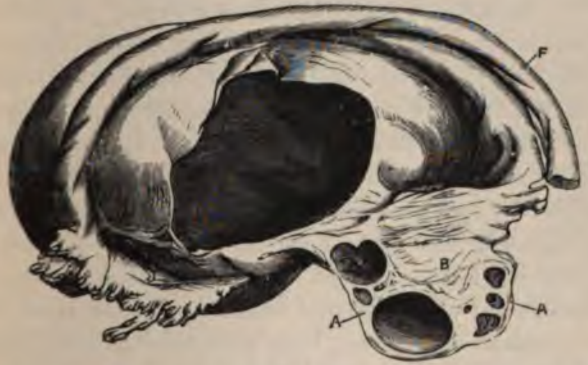


FIG. 114.—A SMALL CYST OF THE PAROVARIUM, SHOWING ITS RELATION TO OVARY AND TUBE. (Two-thirds its natural size.)

A, Oöphoron; B, paroöphoron; F, Fallopian tube. (From Bland-Sutton's work "On Tumours.")

The fluid they contain is limpid and slightly opalescent; specific gravity, 1002 to 1007; reaction slightly alkaline. A substance precipitated by alcohol is present in large quantity.

In large cysts the fluid is often turbid, and may contain cholesterin. When parovarian cysts rupture into the cœlom (peritoneal cavity) the fluid is quickly absorbed and excreted by the kindeys.

The chief anatomical points which enable a parovarian to be distinguished from an oöphoronic cyst are:

1. The peritoneal coat is easily stripped off;
2. The ovary is usually attached to the side of the cyst;
3. The cyst is, as a rule, unilocular;
4. The Fallopian tube is tightly stretched across the cyst, and does not communicate with it.

The age at which parovarian cysts occur is of some interest. It has already been mentioned that cysts of the oöphoron are encountered at any period, from fœtal life up to extreme old age. The occurrence of a parovarian cyst has not so far been recorded in an individual before the age of sixteen. Many undoubted cases have been observed at seventeen, eighteen, and nineteen, the cysts being large enough to rise above the pubes. Before sixteen the parovarium appears to be quiescent, but on the advent of puberty it seems to undergo great stimulation. A very large proportion of cysts, generally classed as ovarian, removed between the ages of seventeen and twenty-five, arise in this interesting structure.

Gartnerian Cysts. — There are good reasons to believe that some papillomatous cysts of the mesometrium, especially those which burrow deeply by the side of the uterus, arise in persistent portions of Gartner's duct.

Cysts of this character which burrow deeply often entail risk in removal, as they lie in intimate relation with uterus, ureter, and bladder; the cyst, when large, will come in contact with the iliac arteries and veins at the brim of the pelvis, and even rest upon the inferior vena cava.

Gartnerian cysts arising in the terminal segment of the duct project into the vagina.

There is a variety of papillomatous cyst arising in the mesosalpinx independently of the ovary or Gartner's duct. These cysts are found near the junction of the tubo-ovarian ligament with the ovary, and burrow between the layers of the mesosalpinx.

When fresh they are transparent, and resemble incipient parovarian cysts. The most striking feature of these cysts is the almost invariable presence of a tuft of warts. It is difficult to be sure of the presence or absence of these warts without opening the cyst. They are composed of very dense fibrous tissue. In this respect they differ in a striking manner from the soft papillomatous masses depicted in Fig. 112.

Ovarian Hydrocele.—In many mammals the ovary is surrounded by a tunic of peritoneum resembling the tunica vaginalis testis. The Fallopian tube opens into this cavity; thus, the ova reach the uterus without entering the cœlom (peritoneal cavity). Occasionally this peritoneal pocket becomes distended with fluid, and is conveniently called an ovarian hydrocele. Such a cyst is very rare in women; many specimens described as ovarian hydroceles are very large examples of hydrosalpinx.

In order to afford some notion of the relative frequency of the various cysts and tumours classed as ovarian, a classified list of 100 consecutive examples, removed by Mr. Bland-Sutton at the Chelsea Hospital for Women, is appended:

Fibromata	2
Sarcomata	2
Carcinoma	1
Simple cysts	45
Adenomata	25
Dermoids	15
Papillomatous cysts	2
Parovarian	5
Tubo-ovarian	3

The three classed as tubo-ovarian were in all probability exceedingly large samples of hydrosalpinx. One was so big that it was in contact with the under surface of the liver.

CHAPTER XXXIX

DISEASES OF THE OVARIES—(*Continued*)

OVARIAN FIBROIDS, SARCOMATA AND CARCINOMATA.

Ovarian Fibroids.—Tumours composed of fibrous tissue arranged in the whorled manner characteristic of the hard uterine fibroid, and with the same microscopic structure, occur in the ovary, and, like the uterine fibroids, are encapsuled. Ovarian fibroids have a disposition to occur towards that pole of the ovary remote from the ligament. When the tumour is small (Fig. 115) the disproportion between it and the ovary is not so marked, but when one of these tumours measures 20 or 30 centimetres in its long axis—for they are nearly always ovoid—the small bud-like remnant of the ovary on the uterine pole of the tumour is very incongruous. Facts are accumulating which show that encapsuled ovarian fibroids are innocent, notwithstanding the fact that they are occasionally complicated with hydroperitoneum, have a wide age limit, and have been observed at the twentieth and as late as the seventy-third year. They have recently been carefully studied by Fairbairn, who shows that they are easily removed, and that the results of operation, immediate and remote, are very good.

Tumours of the ovary supposed to be **myomata** were probably ovarian fibroids.

Sarcomata.—The ovary (like the kidney and retina) is very prone to become the seat of sarcoma in early life. To this succeeds a period of comparative immunity, followed by a second period of renewed but diminished liability.

The sarcomata of infant life attack both ovaries in more than half the cases; they grow rapidly, infiltrate the ovary throughout, attain formidable sizes, and quickly destroy life.

Structurally, they consist of round and spindle celled elements in which collections of cells are often conspicuous, resembling the alveolar disposition characteristic of cancer. These supposed alveoli are ovarian follicles entangled in the general overgrowth of the ovarian stroma. It may be taken as a useful rule that the softness of an ovarian sarcoma, especially in young women, is a fair indication of its degree

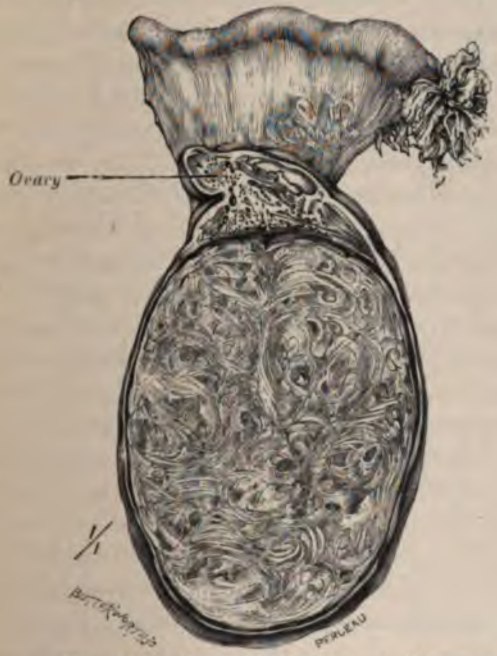


FIG. 115.—OVARIAN FIBROID IN SECTION.

of malignancy. Those very soft tumours which resemble a boiled suet-dumpling are excessively malignant; fortunately they are not common.

The first period of exceptional liability ends at puberty. Ovarian sarcomata are very rare from the sixteenth to the twenty-fifth year. From this age to forty-five they are met with occasionally, and are in most cases unilateral. They rapidly destroy life. Ascites complicates the last stages.

Carcinoma of the Ovary.—Primary cancer of the ovary is a rare disease, and one concerning which we know little. We have come to learn that the ovaries are common situations for secondary cancer, especially when the disease arises primarily in the breast, gastro-intestinal tract, or the gall-bladder. In a fair proportion of patients both glands are infected, and in some instances the ovaries are so enlarged as to be obvious as tumours on physical examination.

Schlagenhaufer published a valuable inquiry showing the frequent association of malignant disease of the ovary with carcinoma of the stomach, intestine, and gall-bladder. In addition to some personal cases, he has collected a large number of recorded observations, making a total of seventy-nine cases, and among these in sixty-one cases the primary focus was in the stomach, ten in the bowels, and seven in the gall-bladder or its associated ducts. The relation between the primary cancer and the masses in the ovary is demonstrated by the fact that the structure of the ovarian tumours varies according to the situation in the gastro-intestinal tract of the primary disease. In studying Schlagenhaufer's tables it is astonishing to find in what a large proportion of patients ovariotomy, unilateral or bilateral, had been performed, and the primary cancerous focus in the stomach overlooked in spite of the presence of typical signs of gastric disturbance, especially persistent vomiting and progressive emaciation.

The practical outcome of these observations is very important, and amounts to this: In cases of bilateral solid tumours of the ovary, if accompanied by vomiting and ascites, a careful and accurate examination should be made of the abdominal viscera, especially the stomach.

It is also significant that whenever surgeons have made inquiries into the remote results of ovariotomy they have been astonished to find that many of the patients have perished from recurrence in the abdomen, or from intestinal obstruction. The fact that many solid tumours of the ovaries are metastatic offers an explanation of some of these unhappy sequences.

We have often been puzzled on examining large deposits of cancer in the ovaries secondary to mammary or gastric carcinoma to satisfy ourselves how these things come to pass. The riddle is, we think, solved by Handley's discovery of the mode in which mammary cancer involves the abdomen. He has demonstrated in a most convincing manner that cancer spreads by permeating the deep fascia. By an insidious process the cancer cells slowly creep along the lymphatics of the fascial plexus until they reach the epigastrium immediately below the ensiform cartilage. At this point the cancer-filled lymphatics of the fascial plexus in the middle line are separated from the subperitoneal fat only by a simple layer of fibrous tissue. Through this weak defence the cancer cells slowly find their way into the general peritoneal cavity, and engraft themselves on the omentum and other suitable visceral plots, whereon they thrive and grow into metastatic nodules or lumps. Many of these infecting cells are conveyed into the pelvis, and lodge on ovary, Fallopian tube, uterus, or pelvic peritoneum. The fluid normally present in the belly serves as an admirable vehicle for the transport of such cells, easily enabling them to reach the pelvic recesses, where they would remain undisturbed to grow into deadly lumps. If we apply Handley's observations on the serpiginous spread of mammary cancer to a primary cancer in the stomach, gall-bladder, or colon we may read its course in this way: Arising in the mucous membrane, it slowly permeates it, and implicates the submucous, muscular, and peritoneal coats. The cancer cells can then escape freely into the great serous cavity, and be distributed by the fluid, aided by the movements of the bowels, and gradually reach the pelvis and other abdominal recesses. In the pelvis the most obvious organs on which they could fall would be the ovaries, as they so often rest on its floor. Under such conditions the ovaries may be fairly pictured in the mind receiving a covering of falling cancer cells, like evergreen shrubs are clothed by snowflakes in winter.

The fact that other parts of the internal genitalia receive these cells is a matter of some importance, because one of the most striking features of operations for the removal of malignant ovaries is the rapidity with which the disease recurs. Lockyer made a valuable observation relating to this. He examined microscopically the tumours removed for bilateral carcinomatous disease, and although the attached tube and mesosalpinx belonging to each tumour appeared normal to eyes and fingers when examined microscopically, they were found extensively infected with cancer through the lymphatics.

Treatment.—The outcome of these pathological observations will determine those who have to deal with bilateral malignant tumours of the ovaries to carefully examine the patient for evidence of primary cancer in the gastro-intestinal tract. If the disease is in such a position that it can be excised with good prospect of success this may be done. Then it will be necessary to remove not only the infected ovaries, but the tubes, adjacent segments of the mesometria, and the uterus. Operations of this kind can only be carried out with hopeful prospects when there is no other evidence of gross infection than that afforded by the ovaries.

When the nature of solid malignant tumours of the ovaries comes to be more thoroughly appreciated by those who devote their attention to the surgery of the pelvic organs, it may enable them to contemplate the clinical aspect of the case with a wider knowledge of its surroundings, and perhaps save themselves and their patients much acute disappointment.

CHAPTER XL

DISEASES OF THE OVARIES—(*Continued*)

THE SECONDARY CHANGES AND COMPLICATIONS OF OVARIAN TUMOURS.

Many of the secondary changes to which ovarian tumours are liable imperil life. The chief changes are: (1) Septic infection; (2) axial rotation; (3) rupture.

1. **Septic Infection.**—Contamination may arise from puncture with a trocar or aspirating needle. More frequently it arises from the entrance of gases from the intestine, due to adhesion of the tumour to an adjacent coil of bowel or to the vermiform appendix, or to infection from the Fallopian tube.

The result of the suppuration is to set up almost universal adhesions to surrounding structures; in acute cases severe symptoms arise, and unless the pus finds an exit the patient dies. Even when the pus finds an outlet the patient leads a miserable existence, becomes emaciated by the prolonged discharge, and dies worn out by suffering.

In *acute suppuration* of a large ovarian cyst the symptoms are very characteristic. The patient presents the usual signs of an ovarian tumour, with pain and tenderness on pressure; the pulse is rapid and feeble, and accompanied by great emaciation and exhaustion. The temperature is at first high, standing at 100° or 102° F. in the morning, and rising to 103° or 105° F. in the evening. As the patient becomes more and more exhausted towards the close of the case, the temperature may fall, and has been recorded as low as 95° F. This low temperature has been observed in cases where the pus was unusually offensive. In many cases the urine contains albumin. The cyst sometimes contains gas. Under such conditions the tumour dulness is replaced by a highly tympanitic note. It is a fact of some interest that suppurating ovarian cysts have given rise to signs simulating typhoid fever, and the patient has been treated for this disease until the accidental discovery of the tumour made the case clear. Suppuration of an ovarian cyst has followed an attack of typhoid fever, and typhoid bacilli have been found in the pus.

Suppurating dermoids of the ovary are by no means infrequent, and, like other forms of ovarian cysts, when inflamed, they become firmly adherent to surrounding structures. They may burst into the cœlom, the rectum, bladder, vagina, or even through the abdominal wall near Poupart's ligament, or at the umbilicus.

Adhesions, from whatever cause arising, are a source of anxiety to the operator when they are abundant. A few straggling omental adhesions are of no moment, or a few fibrous bands connecting the cyst to the anterior abdominal wall ; but when tracts of small intestine or colon are firmly united to the cyst-wall by broad fibrous bands, or the tumour is fixed to the pelvic peritoneum by dense adhesions, the task of removing the tumour is very anxious, tedious, and occasionally impossible.

The mode by which adhesions arise is identical with the process by which bands form in connection with the intestines. The peritoneum becomes inflamed, and the exudation which accompanies that process—the so-called lymph—organizes and undergoes slow conversion into fibrous tissue. When the parts united by this material remain in apposition whilst it organizes, a sessile adhesion results. When there is movement between the parts during the process, then the uniting material becomes elongated into bands—broad or narrow, according to the extent of surface involved.

2. **Axial Rotation.**—Abdominal tumours of all kinds are liable to turn round on their axis—a movement which leads to twisting (or torsion) of the pedicle, and interferes with the circulation in the tumour. Ovarian tumours, large and small, are very liable to rotate. This movement frequently occurs when an ovarian tumour complicates pregnancy or a uterine fibroid; it has been especially noticed to follow the diminution in size of the uterus after delivery at term, or abortion. In one instance in which a prolapsing uterus was associated with an ovarian cyst, the dragging of the uterus as it slipped out of the vagina caused the cyst to rotate and twist its pedicle; it became impacted in the pelvis, and prevented replacement of the uterus until the cyst had been removed.

Rotation of a cyst in the early stages of pregnancy is due probably to the gradual enlargement of the uterus displacing the tumour upward; as the pressure is exerted upon one side of the cyst, it would be in a favourable position to impart a rotary motion to a non-adherent cyst.

The *amount* of rotation varies greatly. In some cases the cyst has only turned through half a circle; in others as many as twelve complete twists have been counted. The direction of the rotation may be from right to left, or *vice versa*, but cysts exhibit a stronger tendency to rotate toward the middle line than away from it. Tumours of the right and left sides are equally liable to rotate. In one instance, at least, in a case of bilateral ovarian dermoids, both tumours had twisted pedicles (Doran).

The effect of torsion on the circulation depends on the tightness of the twist, and this varies with the thickness of the pedicle. The vessels in a long, thin pedicle would suffer obstruction quicker than those in a short and thick one. When a pedicle is twisted, the thin-walled veins become compressed, whilst the more resilient arteries continue to convey blood to the cyst. The result is severe venous engorgement, and this leads to extravasation of blood into the cyst-wall; in many cases the veins rupture, and hæmorrhage takes place into the cavity of the cyst. The hæmorrhage may be so profuse as to cause the cyst to burst. Cases have been reported in which a patient has died in a few hours from this cause.

Occasionally the tumour will be completely detached from its pedicle in consequence of torsion. The force with which large cysts rotate is very great, for in some instances the uterus is involved in the twist. Parovarian cysts are liable to rotation and even complete detachment (Fig. 116), and in one recorded instance the ovary was involved in the twist and completely divided (Comyns Berkeley).

The signs of acute rotation of an ovarian cyst are often so characteristic as to lead to a correct diagnosis. When a woman complains of sudden and violent pain in the abdomen, accompanied with vomiting, and she is known to have an ovarian tumour, or she presents herself for the first time to the surgeon, and these signs are associated with an abdominal swelling, the physical signs of which are indicative of an ovarian tumour, axial rotation should be suspected. When the patient has an ovarian tumour and is pregnant, or has been recently delivered, this is an additional reason for suspecting that the symptoms arise from a twisted pedicle.

It is important to remember that the predominant signs of acute axial rotation of abdominal organs and tumours are those common to a strangulated hernia minus stercoraceous vomiting, and even this will be present should a piece of gut be involved in the twists of the pedicle.

3. **Rupture.**—Ovarian cysts are liable to burst into the cœlom either without any obvious cause (spontaneous rupture) or from violence—for example, during "an immoderate fit of laughter," or whilst stooping to "button the boots," during vomiting, coughing, the manipulation of a physician, or a fall.

The signs of rupture of an ovarian cyst are: (*a*) Sudden accession of pain, accompanied by alteration in the shape of

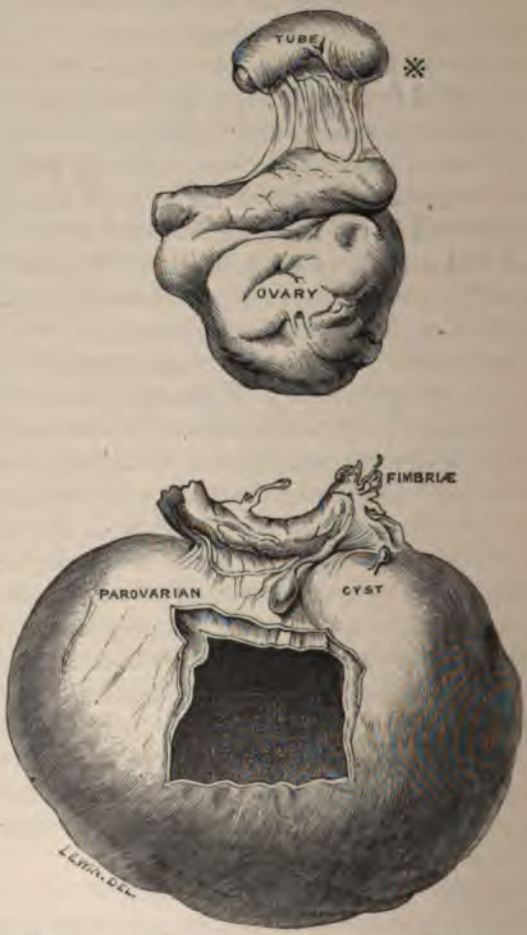


FIG. 116.—OVARY AND STUMP OF A FALLOPIAN TUBE, LEFT AFTER AXIAL ROTATION, ENDING IN COMPLETE DETACHMENT OF A PAROVARIAN CYST.

* The rounded stump of the tube at the point of detachment.

the tumour; (*b*) subsequent profuse diuresis; (*c*) gradual re-accumulation of the fluid in the cyst.

The results of such an accident depend on the nature of the cyst. The rupture of a parovarian cyst is not attended with ill effects; the cyst may refill and burst repeatedly.

When the rupture of an ovarian cyst is due to axial rotation, then the patient may die from hæmorrhage. In the case of an adenoma, the mucoid material forms a curious sago-like deposit on the peritoneal surface of the viscera. In rare cases, cells from a dermoid will become engrafted on the peritoneum and form secondary dermoids.

The rupture of papillomatous cysts is invariably followed by secondary warts on the peritoneum and hydroperitoneum. When suppurating cysts burst into the cœlom, rapidly fatal peritonitis is the consequence.

Ovarian cysts, especially dermoids, may burst into hollow viscera, usually the rectum or the bladder. When the contents of a dermoid escape into the bladder, it is a source of great misery, as the hair, teeth, or bones serve as nuclei for phosphatic deposits.

Modes of Death.—Tumours of the ovaries are now so promptly removed when discovered that there are happily few opportunities of studying the way in which they destroy life. It will be useful to enumerate the modes of death: (1) Pressure on ureters, hydronephrosis, uræmia; (2) cystitis, pyelitis; (3) intestinal obstruction; (4) suppuration of cyst, septicæmia; (5) peritonitis from leakage into the cœlom; (6) large cysts impede respiration by pushing up the diaphragm and thus compressing the lungs; (7) hæmorrhage from rupture of cyst; (8) impediment to labour.

Symptoms and Diagnosis.—The symptoms which induce women with ovarian tumours to seek advice vary with their size. When the tumour is restricted to the pelvis, the troubles it may cause are different to those it may produce when it is large enough to rise above the pelvic brim and occupy the abdomen. When the tumour is large enough to rise up out of the pelvis, the only troublesome symptom, in a very large number of cases, is progressive enlargement of the belly. This, in a married woman, is often attributed to pregnancy; in young unmarried women it is a source of annoyance, as it leads occasionally to a suspicion of pregnancy. At other times the pressure effects induced by ovarian tumours, such as troubles with the bladder, hydronephrosis, œdema of the leg and dyspnœa, induce patients to seek advice.

When the tumour is small enough to be accommodated in the pelvis, it causes trouble by becoming impacted and exercising baneful pressure on bladder, ureters, rectum, and intestines.

Should complications arise (such as axial rotation, inflammation, or suppuration of the cyst), they will lead to detection of the tumour.

In a typical case of ovarian tumour the size of the abdomen is increased. With a big cyst the enlargement is general, but when the tumour is of moderate dimensions it is localized to one or other flank. Local enlargements due to ovarian tumours are always most marked below the level of the umbilicus. The skin of the abdomen sometimes presents a brown discoloration, and the superficial veins may be distended.

On *palpation*, the swelling feels firm and resisting. In cystic tumours its surface is uniform, as a rule, but multilocular cysts may have an irregular surface; this is also true of ovarian adenomata. Manipulation rarely causes pain. In large cysts a wave of fluctuation can easily be produced; in multilocular cysts the sign is restricted to large cavities. The distinctness with which the wave is perceived depends upon the character of the fluid and the thickness of the abdominal wall.

Percussion furnishes valuable evidence. The crown and sides of the swelling are quite dull, but on approaching the loins the dulness gradually gives way to resonance. If, now, the patient be turned to one or other side, we shall find that the alteration in position does not affect the percussion-note. In those exceptional cases where the cyst communicates with intestine the swelling yields a tympanitic note on percussion, due to the presence of intestinal gas.

Auscultation, as a rule, gives no information. Gurgling of intestines and, occasionally, the pulsation of the aorta may be perceived, and very rarely a bruit has been detected. In non-ovarian tumours this method of physical examination often affords valuable information. After examining the abdomen, the surgeon should explore the parts by an internal examination. As a rule, this is best made through the vagina, but in young unmarried girls it will sometimes be necessary to make the examination by the rectum. In this way the surgeon ascertains the relation of the tumour to the uterus, the condition of this organ, and the state of the rectum. In some uncomplicated cases of ovarian tumour the information furnished by a vaginal or rectal examination is negative, but it should always be undertaken.

The recognition of a large, uncomplicated ovarian cyst is one of the simplest processes in clinical surgery. The signs may be thus summarized : A swelling of the abdomen, most marked below the umbilicus, associated with absolute dulness to percussion all over the tumour, most marked on its summit, and fading away to resonance in the flanks ; such dulness is not affected by alteration in the position of the patient. If such signs be associated with a uterus of normal size, the presumption that the swelling is an ovarian tumour is as certain as most things in clinical medicine.

The *diagnosis* of simple cases of ovarian tumour rarely gives rise to difficulty if the surgeon duly weighs the various signs together, and does not place too much reliance on any one of them. Difficulty arises sometimes in distinguishing between ovarian tumours and conditions which simulate them; the greatest care and skill are needed when diagnosis is complicated by secondary changes in the cyst and by the co-existence of other tumours, abnormal conditions of the abdominal viscera, ascites, or pregnancy.

The diagnosis of ovarian tumours involves the question of the diagnosis of abdominal swellings in general. Indeed, there is no organ in the belly which has not at some time or other given rise to signs resembling those presented by an ovarian cyst. These facts alone will serve to show that there is no pathognomonic sign indicative of an ovarian tumour. In many cases the methods of physical examination are incompetent to enable us to form a correct opinion of the nature of an abdominal tumour until it has been actually exposed to view; even then doubts and difficulties arise.

Ovarian Tumours and Pregnancy.—When an ovarian tumour complicates pregnancy, it is not too much to state that the life of the woman is in peril throughout the period, and the danger increases with each succeeding month of gestation, and often culminates with labour or abortion.

During pregnancy the chief dangers to be apprehended are:

1. Axial rotation of the tumour;
2. Rupture of the cyst;
3. With large tumours, impediment to respiration;
4. Incarceration of the tumour in the pelvis.

Axial Rotation.—This danger has already been discussed (p. 360), but it may with advantage be restated that when each ovary has a tumour, and pregnancy ensues, the chances of axial rotation occurring is more than doubled.

Rupture.—An ovarian cyst complicating pregnancy may burst, but the accident is not necessarily lethal, as the fluid may be absorbed and excreted by the kidneys. In some cases, however, it is an accident that will destroy life.

Impediment to Respiration.—When a large ovarian cyst and a gravid tube coexist, the tumour will sometimes push up the diaphragm and encroach on the thoracic space, and seriously hamper respiration.

Incarceration of the Tumour in the Pelvis.—The risks which women run from pregnancy complicated with an ovarian tumour vary with the position of the tumour; when it lies in the pelvis, and therefore behind the uterus, it becomes impacted in the hollow of the sacrum as the uterus enlarges. In this situation it may be burst, or mechanically interfere with the functions of the rectum or bladder. It is very apt to cause abortion. In one instance a young married woman with a small ovarian tumour behind the uterus aborted three times in eighteen months, and when she was two months pregnant for the fourth time, ovariotomy was performed, and the pregnancy went to term.

These facts make it clear that *pregnancy exerts a baneful influence on ovarian tumours; and ovarian tumours are, as a rule, inimical to successful pregnancy.*

The appreciation of this fact has led surgeons to remove ovarian tumours whenever they are found complicating pregnancy, and from a study of a large number of records the following results may be stated:

1. Before the fourth month of pregnancy, single and double ovariotomy is attended with a very low mortality, and the risk of disturbing the pregnancy is small.

2. The removal of a parovarian cyst during pregnancy is more liable to be followed by abortion than single or double ovariotomy.

3. After the fourth month the risk is that of an ordinary ovariotomy, but the chance of abortion increases with each month.

It is a fact that ovariotomy may be safely carried out between the eighth and ninth months of gestation, even when the tumour is incarcerated in the pelvis without precipitating labour.

Ovarian Tumours and Labour.—It is undeniable that in many instances women with ovarian tumours have passed through many labours without mishap. A much larger proportion of women pass through the nine months of pregnancy without inconvenience, but with the accession of labour, trouble is almost sure to arise. The dangers differ according to the position of the tumour. It may be said that when an ovarian tumour lies high in the abdomen *delivery exercises a baneful effect on the tumour*, but when the ovarian tumour occupies the pelvis *it exercises a baleful effect on the uterus and its occupant.*

1. *When the tumour is situated above the uterus the following accidents may happen* :
   (*a*) Rupture of the cyst ;
   (*b*) Axial rotation ;
   (*c*) Suppuration of the cyst.

2. *When the tumour occupies the pelvis, it offers mechanical impediment to delivery. The fœtus invariably dies in these circumstances.*

The following accidents have happened :
   (*a*) Rupture of the cyst ;
   (*b*) Rupture of the uterus ;
   (*c*) Rupture of the vagina ;
   (*d*) Extrusion of the tumour through the anus.

Many methods have been advocated and practised for the relief of women when the passage of the child is obstructed by an ovarian tumour incarcerated in the pelvis by the gravid uterus. No attempts should be made to pull the child through by forceps or by turning. Obstetricians of repute recommend that an endeavour should be made to push the tumour out of the pelvis, if possible, and if this be accomplished the delivery should be completed and the woman allowed to pass through her puerperium, and subsequently submit to ovariotomy. This method, known as **reposition,** is attended with two grave dangers: (1) Rupture of the cyst; (2) axial rotation of the tumour. If the tumour cannot be pushed up, then ovariotomy must be resorted to without delay, and in some of the recorded cases the tumour has been so firmly incarcerated in the pelvis that it has been necessary to perform Cæsarean section in order to allow the tumour to be extricated.

Looking at the subject broadly, the rules for treatment may be formulated thus: (1) When an ovarian tumour is discovered during labour, and it impedes delivery, ovariotomy should be performed. (2) If the tumour offer no obstacle to the passage of the fœtus, it should not be interfered with until after the puerperium, unless unfavourable symptoms arise.

Ovarian Tumours and Puerpery.—It is not stating the case too positively to assert that "when an ovarian tumour complicates pregnancy, the life of the woman is imperilled throughout the whole of the term; the peril increases with each succeeding month of gestation, and culminates in a climax with labour (or abortion)." During delivery, however, mischief may be produced which is only appreciable during the puerperium.

The three great dangers are:

1. Rupture of the cyst;
2. Axial rotation;
3. Suppuration of the cyst.

The dangers are profound enough when they supervene in a puerperal woman known to possess an ovarian tumour, but the peril is very greatly intensified when an ovarian tumour complicates labour and the puerperium and its presence is not even suspected; unfortunately, such cases are not infrequent, and in these circumstances the unfavourable signs are very often attributed to "puerperal fever," and the patient almost invariably dies.

It is now a well-attested fact that ovariotomy can be successfully performed even while labour is in progress—that the operation in no way interferes with the contraction of the uterus. Single and even double ovariotomy can be successfully performed in the puerperium without in any way interfering with either the involution of the uterus or lactation. Therefore it cannot be too strongly urged that *when a puerperal woman known to possess an ovarian tumour exhibits unfavourable symptoms, ovariotomy should be resorted to without delay.*

CHAPTER XLI

DISEASES OF THE OVARIES—(*Continued*)

DIFFERENTIAL DIAGNOSIS AND TREATMENT OF OVARIAN TUMOURS.

Method of Examination.—When a woman suspected of an abdominal tumour comes under observation, it is the duty of the surgeon or physician, as the case may be, to inquire into the history of the case. Information concerning the age, social condition, and menstrual history is often as important in diagnosis as a knowledge of the general physical condition of the patient, and the facts she may be able to relate concerning the tumour itself.

In conducting the physical examination of the patient, she should, whenever possible, be undressed, for nothing is so unsatisfactory as examining an abdomen to ascertain the existence or nature of a tumour when the parts are encumbered by partially loosened skirts, stays, petticoats, and other garments.

The patient should be placed, when undressed, with her back flat upon a bed or couch, and the legs covered with a sheet or blanket. The surgeon should be careful that his hands and finger-tips are warm, as cold fingers are very uncomfortable to the patient, and hinder a proper examination.

At the outset he first attempts to assure himself of the existence of an abdominal swelling by employing his eyes, aided by palpation and percussion; often auscultation renders important assistance.

Tumours are often simulated by **obesity**, and an accumulation of subcutaneous fat has so deceived surgeons that in several recorded cases the abdomen has been opened before the character of the enlargement was recognised.

The strangest of all conditions simulating tumour is the "puffing up of the belly" known as **phantom tumour**, where a woman thinks she is pregnant or suffering from a tumour. To avoid error, it is only necessary to be aware of the possibility of the condition. On percussion, the belly is everywhere resonant, and by cautiously engaging the patient in conversation during the manipulation it becomes quite flat. If, after physical examination, the surgeon is unable to decide the question with certainty, he should arrange for the administration of an anæsthetic; as a woman becomes unconscious, the swelling diminishes, then the belly becomes flat; as consciousness returns, the swelling reappears.

Phantom tumour is liable to occur in sterile women who have married late in life, and especially in women who have a morbid desire for pregnancy. It is occasionally met with in women who have borne children, and now and then in young wives. Sometimes it is seen in women who have subjected themselves to illicit intercourse, and fear the results.

It is difficult to understand how this condition could be mistaken for an abdominal tumour, yet more than one case has been recorded in which the abdomen was opened to remove the supposed tumour. Most of the cases occurred in the early days of ovariotomy, and now that surgeons are fully aware of the condition, and with the assistance afforded by an anæsthetic, such blunders are not likely to be made.

Pregnancy, normal and abnormal, and **uterine tumours,** often simulate ovarian tumours (see p. 226) The remaining conditions which are apt to be mistaken for ovarian tumours are the following:

1. Ascites and hydroperitoneum;
2. Distended bladder;

3. Fæcal accumulation ;
4. Renal cysts and tumours ;
5. Splenic enlargement and tumours ;
6. Morbid conditions of the gall-bladder ;
7. Cysts of the pancreas, mesentery, or omentum ;
8. Lipomata ;
9. Echinococcus cysts ;
10. Dilated stomach.

Ascites.—An accumulation of free fluid in the belly is, as a rule, easily distinguished from an abdominal tumour, but many instances have been recorded in which ascites has been mistaken for an ovarian cyst, and *vice versâ*.

A well-marked case of ascites rarely causes difficulty in diagnosis. The abdomen is uniformly enlarged ; when the patient lies on her back the fluid occupies the flanks, and when abundant the sides of the belly form a convex curve from the lower ribs to the crest of each ilium. On percussion, the flanks and lower half of the abdomen are dull, whilst around the umbilicus a clear, resonant note is obtained. If the patient be now turned to one or other side, the conditions are reversed ; the higher flank becomes resonant and the umbilical region dull. This shifting dulness is the most characteristic sign of ascites. In addition, when the fluid is present in sufficient quantity, a percussion wave may be easily produced from side to side.

When free fluid in the cœlom is associated with secondary cancer or the presence of a tumour, innocent or malignant, then the diagnosis may be difficult. This condition is discussed in the chapter on Hydroperitoneum.

Attempts have been made to detect among the fluids found in the belly and in cysts of the ovary characters (chemical, microscopic, or spectroscopic) which would serve to distinguish them from each other, but to no purpose.

Distended Bladder.—It is of the first importance in investigating a doubtful case of abdominal tumour to obtain a sample of the urine, and to ascertain the quantity as well as the quality of the secretion. An *overfull bladder* has a striking pyriform shape, and may extend as high as the navel and simulate a tumour. Such overdistension may be due to pressure on the urethra from a pelvic tumour or a retroverted (incarcerated) gravid uterus (p. 228).

Fæcal accumulation (coprostasis) in the rectum, cæcum, or colon will simulate an abdominal tumour. Copious enemata will quickly settle the doubts in such a case.

The Kidney.—Abnormal conditions of the kidney often simulate ovarian tumours, especially sarcomata, hydronephrosis, or pyonephrosis. When movable, misplaced, or single, a kidney has often caused great difficulty in diagnosis, especially when it occupies the hollow of the sacrum.

The *physical signs* of a renal tumour are very characteristic. There is a swelling in one or both loins which yields a dull sound on percussion; but, as the colon lies in front of the kidney, an area of resonance is usually present when it is percussed from the front.

The Spleen.—When enlarged, this viscus forms a tumour extending from the left hypochondrium obliquely downward to the umbilicus, and as far as the pelvis when very large. It gives rise to dulness on percussion, moves up and down with respiration, lies in front of the colon, and presents a characteristic notched border.

Occasionally the spleen has such a long pedicle that it may reach every region of the abdomen, and even lodge on the floor of the pelvis. Such "wandering" spleens are liable to twist their pedicles.

Very large spleens have been mistaken for ovarian or uterine tumours, more often the latter. In one remarkable case cœliotomy was performed, and a tumour supposed to be a uterine fibroid was removed; subsequently, when the fragments were examined microscopically, the tissue was discovered to be splenic (Varneck).

When the spleen is occupied by a large echinococcus colony, then the resemblance to an ovarian cyst is very close.

The Liver.—When the liver is greatly enlarged, it has simulated an ovarian tumour. A very distended gall-bladder may simulate a renal tumour, cancer of the pylorus, or even an ovarian cyst with a long pedicle. But a very large gall-bladder has been known to reach into the hypogastrium.

Lipomata.—Large tumours, sometimes as big as a football, composed of fat, grow in the mesentery, subperitoneal tissue, or even in the mesometrium, and very closely simulate ovarian cysts.

A greatly distended **stomach,** a large cyst of the great omentum (omental hydrocele), chyle cysts of the mesentery, pancreatic cyst, and echinococcus colonies in relation with any abdominal viscus are sometimes sources of difficulty in diagnosis, but they rarely complicate the differential diagnosis of tumours of the pelvic organs.

In order to emphasize the occasional difficulty in diagnosis, cases have been reported where a very enlarged and distended stomach has been operated upon and tapped, the surgeon being under the impression that he was dealing with an ovarian cyst.

Treatment.—The treatment of ovarian tumours, including in this general term tumours of the oöphoron, paroöphoron, and parovarium, is early removal. It has been shown by an overwhelming amount of evidence that the earlier these tumours are removed the more likely is the operation to be followed by success. The removal of an uncomplicated ovarian tumour by a surgeon of experience in abdominal operations is the safest and most successful major operation in surgery. As it is impossible from a macroscopic examination to distinguish between a benign and a malign ovarian cystic tumour, we have for several years removed them entire, even when this proceeding involved an incision from the ensiform cartilage to the pubes.

Ovariotomy has been successfully performed on an infant of four months (D'Arcy Power) and a woman of ninety-four years (Knowsley Thornton). In girls between the ages of ten and fifteen years ovariotomy is attended with great success. Even suppurating cysts are removed with admirable results.

Mortality.—Speaking generally, the deaths from ovariotomy vary from 5 to 10 per cent. in experienced hands ; now and then operators get a run of twenty, fifty, or even one hundred cases without a death. With less experienced surgeons the death-rate will vary from 15 to 20 per cent.

CHAPTER XLII

DISEASES OF THE PELVIC PERITONEUM AND CONNECTIVE TISSUE

SEPTIC INFECTION; EPITHELIAL INFECTION; HYDROPERITONEUM; PELVIC CELLULITIS AND ABSCESS.

The pelvic region of the cœlom in a woman differs from that of a man in that the peritoneal lining is more complexly arranged and invests more organs; in addition, two mucous canals—the Fallopian tubes—open directly into it. The frequency of peritonitis in women is out of all proportion to its occurrence in men, and the excessive liability of women to peritoneal infections is almost entirely due to this curious relationship of the pelvic portion of the cœlom to the Fallopian tubes.

1. **Septic Infection.**—In dealing with salpingitis, it was pointed out that septic infections of the uterus, whether arising primarily in the cavity of that organ, or extending to it from the vagina, are very liable to implicate the Fallopian tubes. In a fair proportion of cases the inflammatory process extends beyond the tubes, and directly infects the pelvic peritoneum. When the septic matter which thus escapes into the cœlom is very virulent, grave disturbances are set up, and death may ensue in a few days.

It was mentioned in Chapter XXX. that in a large number of cases salpingitis is a result of septic endometritis following upon abortion or delivery at term; it is important also to appreciate the fact that when pelvic peritonitis occurs as a sequel to labour it is in very many cases called "puerperal fever" or "puerperal peritonitis." As a matter of fact, observations are by no means wanting to demonstrate that in many cases thus classed the disaster (causing in very many cases the death of the patient) was due to actual conveyance of septic matter from the uterine cavity into the recto-vaginal pouch.

Serous Perimetritis.—The essential features of this variety of pelvic peritonitis consists in a collection of inflammatory exudation in the recto-vaginal fossa, which floats up the adjacent intestines and omentum; these become matted together and to the uterus, so as to form a sort of spurious roof to the pelvis. Under these conditions, the fluid collected in the pelvis very closely simulates a retro-uterine cyst.

When inflammatory exudation collects in the utero-vesical pouch, and becomes, as it were, encysted by the intestines, the condition is sometimes called "anterior serous perimetritis." The physical signs of such a collection of fluid have so deceived some surgeons as to lead them into the belief that they had to deal with an ovarian tumour.

2. **Epithelial Infection.**—In this book mention has been made of epithelial infection of the peritoneum, and it will be useful to briefly summarize our knowledge of this condition. It occurs in connection with the following affections:

(*a*) Papillomatous cysts;
(*b*) Ovarian dermoids;
(*c*) Cancer of uterus, gall-bladder, rectum, and sigmoid flexure.

It has already been stated that when papillomatous cysts rupture into the cœlom the fluid contents of the cysts, often heavily charged with cells, are scattered over the peritoneum; it naturally follows that the recto-vaginal and utero-vesical fossæ become inundated with fluid, and the cells sink to the lowest parts of these recesses. In many cases the cells engraft themselves on the peritoneum and grow into warts. This accounts, in cases of affections of this kind, for the abundance of warts on the pelvic peritoneum in comparison with other parts.

Similar changes are sometimes associated with the rupture of ovarian dermoids, and one case has been reported in which the peritoneum was beset with small tufts of hair secondary to an ovarian dermoid. Several cases have been carefully observed and reported, in which the peritoneum has been dotted with minute dermoids secondary to the rupture of primary ovarian dermoids.

In Chapter XLIII. it will be shown that echinococcus colonies sometimes infect the peritoneum in a similar manner. The condition is strongly exemplified when the peritoneum is infected with cancer. Anyone who has had merely a moderate experience in the dead-house must have noticed in individuals dying from cancer of the uterus, colon, or gall-bladder that in the majority of instances the peritoneum is free from deposits. Yet occasionally a case comes under observation in which the peritoneum is crowded with hundreds of minute nodules. In such cases a careful examination of the tumour will reveal the existence of a small process of the cancer which has perforated the serous covering. This process may be no larger than a split-pea, yet it is sufficient to produce hundreds of secondary nodules on the peritoneum. When the cancer involves the peritoneum, fluid is sure to be exuded (hydroperitoneum), and the movement of this fluid serves as an excellent means of disseminating the epithelial cells over the belly (p. 354).

3. **Hydroperitoneum.**—This may be defined as an accumulation of free fluid in the belly, due to the irritation of primary or secondary tumours of the abdominal viscera, or to the extension of tubal disease, especially tuberculosis, to the peritoneum.

Fluid effusion in the belly secondary to cardiac or renal disease or obstruction to the portal circulation is due to passive causes, and the name ascites should be restricted to it; hydroperitoneum depends on an active irritative cause, and is met with in the following pelvic conditions: Papillomatous cysts of the ovaries; ovarian sarcomata; ovarian dermoids with burst loculi; occasionally with inflamed ovarian cysts and uterine fibroids; tubercular peritonitis; mild forms of salpingitis; and adenoma of the Fallopian tubes.

In the greater proportion of cases hydroperitoneum causes no difficulty. Scattered nodules in the omentum and in the parietal peritoneum are signs rarely misinterpreted. The conditions which give rise to difficulty are those occurring in women about mid-life who are apparently in excellent health, but seek advice on account of increase in the size of the belly, which furnishes on physical examination the ordinary signs of ascites; but there is no œdema of legs or eyelids, no cardiac disease, urine normal in quantity and quality, and no signs of liver trouble. On careful examination of the abdomen, there is no evidence of the existence of a solid tumour, and perhaps on vaginal examination only an indefinite resistance is made out on each side of the uterus. In such conditions the fluid increases in quantity very rapidly, and renders interference imperative.

Treatment.—In all cases where there is reasonable doubt as to the cause of hydroperitoneum, it is a wise course to place the patient under the influence of an anæsthetic and make a small incision in the linea alba, midway between the umbilicus and the pubic symphysis; and, after allowing the fluid to escape, it is usually easy to determine the cause of the hydroperitoneum. In many cases the peritoneum, visceral and parietal, is found dotted with a multitude of minute secondary nodules; then the fluid is cautiously sponged out and the incision closed. Even then it is to the patient's advantage, as a clear diagnosis is insured. On the other hand, and by no means infrequently, a pedunculated and easily removable tumour of the ovary, uterus, or Fallopian tubes is found, the removal of which is accompanied by a rapid convalescence and restoration to vigorous health.

It is also important to remember that hydroperitoneum is sometimes complicated with hydrothorax, and the removal of the cause of the cœlomic effusion—ovarian, uterine, or tubal tumour—is sometimes followed by rapid absorption of the fluid in the pleural cavities.

4. **Pelvic Cellulitis** (**Parametritis**).—This signifies inflammation of the connective tissue between the folds of the broad liagment (mesometrium).

Causes.—It is usually a sequence of septic changes originating in the cervical canal and cavity of the uterus following abortion, delivery at term, especially instrumental delivery, and operation on the uterus, and is often associated with some injury opening up a communication between the uterine canal or vagina and the connective-tissue tract of the mesometrium —for example, a deep laceration of the cervix. It occasionally complicates salpingitis.

Pathologically, pelvic cellulitis does not differ from septic inflammation of connective tissue in more superficial regions of the body. The change consists in the infiltration of the connective tissue of the mesometrium with inflammatory products, and the effects depend upon the extent of tissue involved and the nature of the virus.

The infiltration usually involves one broad ligament, displaces the uterus, and at the same time fixes it. When the left broad ligament is involved, the exudation may surround the rectum. When the infiltration is very extensive, it elevates the broad ligament above the level of the true pelvis, and the exudation extends into the subserous tissue of the anterior abdominal wall. Occasionally it infiltrates the connective tissue in the cave of Retzius, and forms a rounded swelling immediately above the pubes (Fig. 115); in a small proportion of cases the exudation extends into the tissue between the

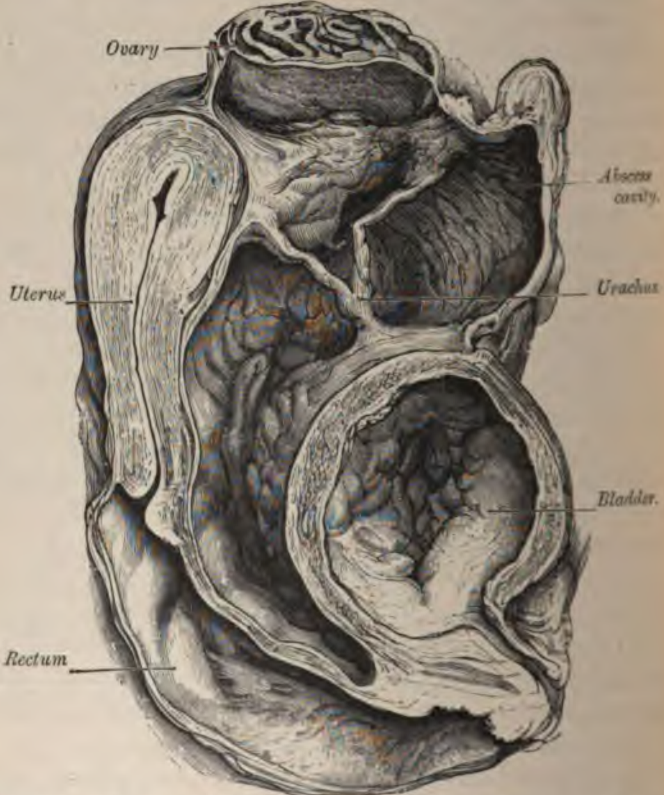


FIG. 117.—SAGITTAL SECTION OF THE PARTS INVOLVED IN PELVIC CELLULITIS (ANTERIOR PARAMETRITIS), IMPLICATING THE CAVE OF RETZIUS. (Museum of the Royal College of Surgeons, from Bland-Sutton's "Diseases of the Ovaries and Tubes.")

cervix uteri and bladder, raises up the peritoneum, and obliterates the utero-vesical pouch. Such exudations sometimes give rise to considerable hypogastric swellings, and cause extreme irritability of the bladder.

In many cases the exudation subsides in the course of a few weeks, and the patient recovers; in some it slowly extends into the subserous tissue, and converts the belly wall into a firm resisting mass. In such cases the illness may be prolonged for many weeks and even months. In a certain proportion of cases suppuration occurs, resulting in a pelvic abscess.

The common forms of pelvic cellulitis are rarely mistaken for other conditions, and should there be any doubt, a little patience will, in most cases, enable a correct diagnosis to be made, for rest will promote absorption of the exudation.

5. **Pelvic Abscess.**—This term signifies a collection of pus between the layers of the mesometrium. Usually it is the sequel of an attack of pelvic cellulitis, but it is sometimes due to the presence of a sequestered extra-uterine fœtus (lithopædion), decomposing blood-clot due to mesometric rupture of a gravid tube, echinococcus cyst, or pus from a pericæcal abscess burrowing under the peritoneum.

The pus in a pelvic abscess points and escapes in one of many situations. The abscess may open into the mucous canals of the pelvis—rectum, vagina, or even the bladder. It may point in the groin, immediately above or below Poupart's ligament; the pus will sometimes burrow beneath the fascia lata, and point in the middle of the thigh, usually on the outer side. Occasionally it travels by the side of the urachus and points at the navel; exceptionally it will burrow through the great sciatic notch and gain the buttock.

Signs.—The onset of pelvic cellulitis is usually marked by a rigor, followed by pain in one or both flanks; febrile symptoms supervene, and, as the exudation increases, troubles during micturition or defæcation are experienced. These signs are of greater significance when they follow within twenty-four or thirty-six hours an abortion, delivery, or an operation on the uterus.

Diagnosis.—On examining through the vagina, a hard mass will be found on one or both sides of the cervix; in many cases the hard masses are conjoined by a ring of hard tissue surrounding the neck of the uterus. When the whole extent of the ligaments is infiltrated the swelling is perceptible at the brim of the pelvis and in the hypogastrium.

When suppuration occurs, the temperature, pulse, and general condition of the patient are those accompanying large collections of pus. The local signs are as follows: the previously hard masses become softer, fluctuation is detected, or the overlying skin is œdematous and perhaps red. The abscess is then said to point.

The pus furnished by a pelvic abscess is often intensely fœtid; this is mainly due to contamination from the bowel. In the course of the formation of the abscess the peritoneum is stripped from the wall of the rectum, and its tissues, becoming softened, allow of the passage of intestinal contents loaded with pathogenic micro-organisms into the exudation, and putrefaction is established.

Treatment.—In the acute stages of pelvic cellulitis the patient is confined to bed, the bowels kept regular by means of saline purgatives, and warm vaginal douches should be frequently administered by a careful nurse. Glycerin tampons help to relieve the pelvic congestion. When there is much abdominal pain, warm fomentations to the hypogastrium give great relief.

When suppuration occurs and the pus can be localized, an incision should be made into it and the abscess drained. It is preferable to evacuate a pelvic abscess through the belly-wall rather than by an incision in the vagina. Should the abscess burst into the vagina, the aperture of communication is apt to close, and defective drainage leads to re-accumulation of pus;

under these circumstances, it is advisable to dilate the opening to insure drainage. When the abscess is due to suppuration of a gestation sac the sinus should be enlarged, and all fragments of bone and other fœtal tissues removed.

As in all cases of prolonged suppuration, the patient's strength must be supported by nutritious and easily digestible food ; quinine and iron preparations are useful, and health is finally restored by change of air.

CHAPTER XLIII

DISEASES OF THE PELVIC PERITONEUM AND CONNECTIVE TISSUE—(*Continued*)

TUMOURS OF THE MESOMETRIUM (BROAD LIGAMENT).

IN addition to tumours of the ovary, parovarium, and Gartner's duct, others sometimes arise from the round ligament of the uterus, the ovarian ligament, as well as from the proper tissues of the mesometrium, and so simulate ovarian and uterine tumours that accurate diagnosis from physical signs is impossible.

It will be convenient to describe them in the following order: Lipomata, myomata, and sarcomata.

Lipomata.—Under normal conditions, fat is sometimes seen between the layers of the mesometrium, but it is rarely met with in the neighbourhood of the Fallopian tube.

Occasionally the mesometrium is occupied by a fatty tumour as large as a fist, and in one exceptional case a lipoma reaching as high as the navel was successfully enucleated from a woman thirty-two years of age; it weighed 5 kilogrammes (Treves).

Myomata.—Unstriped muscle fibre, apart from the uterus and Fallopian tubes, exists in three situations in the mesometrium: (1) In the round ligament of the uterus; (2) in the ovarian ligament; (3) in the connective tissue between its folds.

(1) *The Round Ligament of the Uterus.*—Myomata and fibromyomata arising in this structure are rare. Several

examples have been recorded in connection with the part of this ligament which traverses the inguinal canal. They are oval in shape, and have been reported as big as cocoanuts.

(2) *The Ovarian Ligament.*—Myomata of this structure have been observed as large as a fist. They simulate small ovarian tumours, and require the same treatment—that is, removal.

(3) *Mesometric Myomata (or Fibroids).*—A stratum of unstriped muscle fibre lies immediately beneath the peritoneum forming the mesometrium, and replaces the subserous tissue which exists in other regions; this layer of muscle fibre is directly continuous with the muscle tissue of the uterus, and is occasionally the source of myomata which may attain large dimensions.

Mesometric myomata are sometimes bilateral, and when of moderate size they are mobile, ovoid in shape, and enucleate easily. After a time they grow with great rapidity, and may in a few months attain a weight of 10 kilogrammes or more. As the tumour rises out of the pelvis, it carries the uterus and its appendages with it. The tissue of such myomata is very liable to become myxomatous, resulting in the formation of large cavities; calcification is not infrequent.

Mesometric myomata have been observed as early as the twentieth year, but the majority occur after the thirty-fifth year. They are very formidable tumours to deal with; the best method of treating them, even when large, is enucleation.

Sarcomata.—These are very rare in the mesometrium and usually consist of spindle-cells. They grow very rapidly, and quickly destroy life. There are good reasons for believing that many specimens described as myomata or fibroids of the mesometrium are really spindle-celled sarcomata. Such tumours occur in other parts of the subperitoneal tissue, especially in the neighbourhood of the kidney; they often resemble a football in size and shape.

Echinococcus Colonies (*Hydatids*) **of the Pelvis.**—In connection with the pelvis, it will be necessary to consider echinococcus cysts in the following situations: (*a*) The uterus; (*b*) the mesometrium; (*c*) the pelvic bones; (*d*) the omentum; (*e*) the Fallopian tubes.

There is no authentic example on record of a primary echinococcus cyst of the ovary. Many cases described in recent years as "hydatid cysts of the ovary" are conditions where the colony has grown primarily in the mesometrium and implicated the ovary secondarily (Fig. 119).

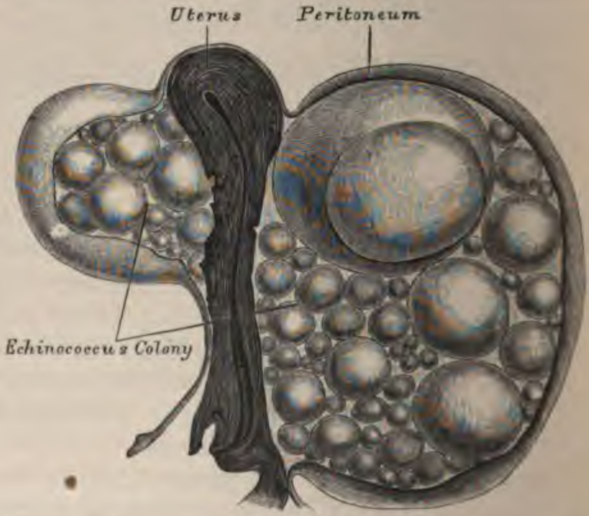


FIG. 118.—AN ECHINOCOCCUS COLONY IN THE MESOMETRIUM (FREUND). (From Bland-Sutton, "Diseases of the Ovaries and Tubes.")

(*a*) *The Uterus.*—Echinococcus cysts have on several occasions been observed growing beneath the peritoneal investment of the uterus, and forming a tumour as large as the patient's head.

Clinically, such cysts simulate either an ovarian tumour or a uterine fibroid. When the cysts contain vesicles there is no difficulty in determining their nature in the course of an operation. When they are sterile, the echinococcus nature of the cyst is rarely suspected.

(*b*) *The Mesometrium.*—Many examples of echinococcus colonies between the layers of the broad ligament have been reported. As a rule, they form part of a general invasion of the subperitoneal tissue. The colonies are apt to communicate with the vagina, bladder, or rectum, and the characteristic vesicles escape with the urine or fæces. Such communications lead to septic infection of the cyst, and suppuration with all its evils is the consequence, or sinuses form in the groin, and the patient sinks exhausted from long-maintained suppuration.

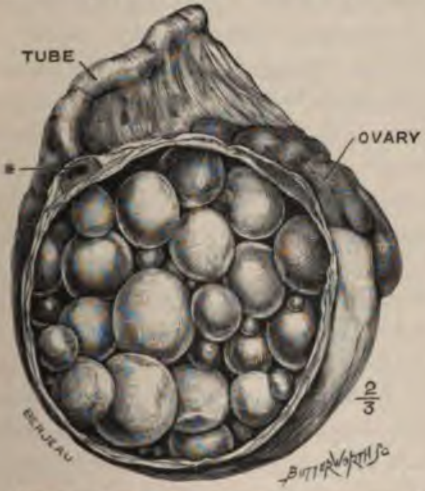


FIG. 119.—A MESOSALPINX WITH THE TUBE AND OVARY IN TRANSVERSE SECTION.

The ovary is flattened upon the wall of an echinococcus colony occupying the mesosalpinx. * The cut surface of the Fallopian tube.

(*c*) *The Bony Pelvis.*—Not the least interesting circumstance in connection with the echinococcus cysts affecting the pelvis is the effect they produce on the bones ; firm osseous barriers offer little resistance to the invading propensities of echinococcus cysts, and they pass from the ilium into the sacrum irrespective of the sacro-iliac synchondrosis. Hydatids of the ilium or ischium erode the walls of the acetabulum, and overrun the hip-joint, and when left to run their course unchecked will extend into the head of the femur.

(*d*) *The Omentum.*—Large echinococcus colonies in the great omentum may lodge in the pelvis, and so simulate the physical signs of ovarian cysts that they deceive the most careful and experienced surgeons. Occasionally they dip so low that they lodge on the floor of the pelvis and fill the recto-vaginal fossa. Accurate diagnosis is then very difficult—indeed, almost impossible.

(*e*) *The Fallopian Tubes.*—Very exceptionally echinococcus vesicles have been found in the Fallopian tubes. In a remarkable case in a woman thirty-two years of age (reported by Doléris) both tubes were so stuffed with vesicles that they formed a large tumour reaching above the umbilicus. The mass weighed 2 kilogrammes, and consisted of the two tubes coiled upon themselves like small intestines, and so elongated that one measured 57 and the other 53 centimetres. The tubes were successfully removed. Maloney described the case of a girl fourteen years of age whose right Fallopian tube was greatly distended and thrown into convolutions by a mass of echinococcus vesicles. The girl had echinococcus cysts in her liver, and one adherent to the fundus of the uterus had communicated with the Fallopian tube.

Secondary Peritoneal Infection.—In the course of a cœliotomy for echinococcus cysts, minute cysts and nodules are sometimes seen scattered over the peritoneum, particularly in the pelvic region. Many of these nodules show the lamination characteristic of echinococcus membrane, and occasionally hooklets will be detected. This condition is due, in all probability, to the escape of fluid from an echinococcus cyst, in consequence either of rupture or of leakage during tapping. Brood capsules escape with the fluid, and, gravitating to the recesses of the pelvis, engraft themselves on the peritoneum.

Diagnosis.—The clinical recognition of echinococcus cysts in the pelvic organs, mesometrium, or bones is sometimes made by a sort of "lucky guess" when other and more common diseases can with certainty be excluded. Occasionally when a patient seeks advice for pelvic trouble, and brings "vesicles" which have escaped by the rectum, vagina, or urethra, much speculation is spared. When the bones are eroded and swellings form under the skin, they are punctured, and characteristic fluid with vesicles and hooklets escapes, and so the diagnosis is established. When the cysts suppurate, the physical signs are those of abscess.

Treatment.—When the cysts take the form of pedunculated tumours, either of the omentum or uterus, they require the same treatment as ovarian tumours—viz., ligature and removal. When sessile, or when their false capsules are very adherent, enucleation of the mother cysts is a very successful measure.

Should the cysts burrow in the mesometrium and open into hollow pelvic viscera, then the treatment of the suppurating cavities and sinuses is very unsatisfactory and is rarely successful. The method of dealing with them should be on the same principle as that adopted for pelvic abscess. The course of the case is very protracted, and death usually occurs from septic complications.

CHAPTER XLIV

DISORDERS OF MENSTRUATION

AMENORRHŒA.

According to most writers, amenorrhœa is of two kinds, primary and secondary; and the former includes cases of retained menses. For descriptive purposes a further classification is required, since, as a matter of fact, four distinct conditions are commonly included under the term amenorrhœa—namely, (1) primary amenorrhœa in cases where puberty is delayed; (2) primary and permanent amenorrhœa; (3) secondary amenorrhœa; (4) retention of the menses. The last condition is one of apparent amenorrhœa, and remains so until the true nature of the case is determined by examination; but in a scientific classification it cannot be included under the term amenorrhœa. For by menstruation must be understood not only the flow of menstrual fluid from the vagina, but also the changes in the endometrium preparatory thereto. In cases of atresia of the genital passage, menstruation is indicated by no outward and visible sign; but the essential periodic changes in the uterus may be going on all the time, though concealed. Hence the condition is not one of amenorrhœa, but is correctly expressed by the term cryptomenorrhœa (*i.e.*, concealed menstruation).

The classification of these conditions is therefore as follows:

A.—Amenorrhœa.
  1. Primary amenorrhœa.
    (*a*) Delayed menstruation.
    (*b*) Permanent amenorrhœa.
  2. Secondary amenorrhœa.
B.—Cryptomenorrhœa.

The following definitions will serve to show the precise sense in which these terms are used.

Before the age of puberty, and after the time of the menopause, the absence of menstruation is not spoken of as amenorrhœa ; hence :

A.—*Amenorrhœa means the absence of menstruation during the usual period of sexual maturity.*

1. *Primary amenorrhœa means the absence of menstruation in the case of a woman who, though above the usual age of puberty, has never menstruated.*

It is clear that a case which appears to be one of " delayed menstruation " may turn out to be one of " permanent amenorrhœa "; hence the terms may have a prognostic rather than a diagnostic value. A more precise definition of these terms will appear later.

2. *Secondary amenorrhœa means the temporary suppression of menstruation during the usual period of sexual maturity.*

A case that appears to be one of secondary amenorrhœa may turn out to be one of premature menopause, if the patient does not menstruate again.

B.—*Cryptomenorrhœa means that menstruation occurs, but its products are retained owing to atresia of some portion of the genital passages.*

We must now consider in detail the different kinds of amenorrhœa.

1. **Primary Amenorrhœa.**—The causes of variation in the age of puberty have already been discussed in Chapter II. It was found that under normal conditions it was not very

unusual for the first menstruation to be delayed till the age of seventeen. Consequently, in the case of a girl of seventeen or younger who has not yet menstruated, we do not say that it is a case of amenorrhœa any more than we should apply the term to the absence of menstruation in a child of ten.

When, however, a girl has reached the age of eighteen or upwards without menstruating, some pathological condition is in most cases responsible for the delay. Up to the age of twenty-five there is still a fair chance of menstruation coming on if the pelvic organs are not abnormally small or ill-developed; but in cases of marked under-development, and in practically all cases above the age of twenty-five, whether under-developed or not, menstruation remains permanently absent. It is clear that no hard and fast line can be drawn to define either the lower or the upper age-limits of "delayed menstruation"; but in view of the above facts the following definitions will serve for clinical purposes:

(*a*) *Delayed menstruation is primary amenorrhœa in a patient of eighteen to twenty-five years of age, whose pelvic organs are normal, or only slightly under-developed.*

(*b*) *Permanent amenorrhœa is primary amenorrhœa in a patient who is over twenty-five years of age, or in a younger woman whose pelvic organs are markedly under-developed.*

Causes of Primary Amenorrhœa.—These are:

1. Constitutional conditions, of which the most important are anæmia and tuberculosis; also some rare conditions, such as cretinism.
2. Defective development of the uterus or ovaries.
3. Pregnancy.
4. Immaturity, without either constitutional disease or malformation of the internal genital organs.

In forming a diagnosis, general conditions must be first sought for; if they can be excluded, a pelvic examination should be made to determine the presence of abnormalities.

It must be remembered that pregnancy may occur before the patient has menstruated. In the absence of the above conditions, a diagnosis of immaturity is arrived at by exclusion.

Prognosis.—We can formulate some general principles to guide us in a prognosis, when consulted in any given case on account of the non-establishment of menstruation. The two points on which we shall most probably be asked to express an opinion are, first, the likelihood of menstruation coming on; second, the likelihood of child-bearing in case of marriage. With regard to the first point, the coming-on of menstruation, our forecast will depend, in the first place, on the patient's age. An analysis of the age of puberty in 1,000 cases shows that—

23·8	per cent.	of girls	do not menstruate	before	the age of	16
18·7	„	„	„	„	„	17
6·1	„	„	„	„	„	18
3·3	„	„	„	„	„	19
1·5	„	„	„	„	„	20
0·9	„	„	„	„	„	21
0·6	„	„	„	„	„	22

Even without examination, therefore, we can give a good prognosis in the case of a girl of sixteen or seventeen; at eighteen or nineteen the prognosis must be more guarded, and the effect of treatment should be watched; after the age of twenty no opinion should be expressed without making an examination.

In the second place, we shall be guided by the general health of the patient. If she be suffering from anæmia, tuberculosis, or other constitutional condition that may cause amenorrhœa, we shall be able to say (with the proviso of age just considered) that menstruation will probably begin when the general condition has improved.

Supposing the general condition to be good, and the patient to be twenty years of age or older, the development of breasts and pubic hair should be noted. Any marked deficiency in these secondary sexual characters is unfavourable; nevertheless, too much reliance cannot be placed on them, and an examination of the pelvic organs should be made. For this purpose it is best to give an anæsthetic, especially if the patient is unmarried. In some cases a recto-abdominal examination will give all the information that is necessary; in others a vaginal examination will be required. If no abnormality can be found, or the uterus is only slightly under the normal size, the prognosis is not unfavourable; on the other hand, if the uterus is very small or rudimentary, or if the ovaries are very small and infantile in shape, the probability is against the establishment of menstruation.

With regard to the forecast as to child-bearing, the question will probably only arise in the case of a patient of eighteen or over, and the first thing necessary will be to examine the pelvic organs. If these are found to be normal, we can say that if the patient is eighteen the prognosis is still fairly good; if she is nineteen and has not menstruated, she is more likely to be relatively, though not absolutely, infertile. If she is twenty or over, the likelihood of child-bearing diminishes rapidly in proportion to the age; and if she is twenty-five or older, she will almost certainly be sterile. If, on the other hand, the uterus is under-developed, the uterine canal measuring 2 inches or less, the patient will be sterile, even though she may menstruate.

Treatment.—When there is any faulty constitutional condition this should be treated. Anæmia especially requires iron with arsenic and strychnine or nux vomica, and as the anæmia improves menstruation is more likely to be established. As to the action of reputed emmenagogues, such as manganese dioxide, potassium permanganate, senecin, etc., the results have not been encouraging. After a reasonable trial of drugs, if no result is obtained, it is usually advisable to examine the pelvic organs, preferably under an anæsthetic; for if a condition of under-development be present, prolonged drug treatment is futile and disappointing to the patient. Under these circumstances it is best to explain the condition and leave matters alone. The most effective stimulus is that supplied by marriage, which may bring to rapid maturity an otherwise tardy reproductive development.

2. **Secondary Amenorrhœa.**—Cessation of menstruation, like primary amenorrhœa, may be temporary or permanent; the latter kind is synonymous with the menopause. The term "amenorrhœa" is not applicable after the menopause any more than it is before puberty; this is why the term "secondary amenorrhœa" is restricted to the temporary condition.

Causes of Secondary Amenorrhœa.—These are:

1. The same constitutional conditions as cause primary amenorrhœa.
2. Pregnancy, lactation, and too-prolonged lactation.
3. Catching cold, as from getting the feet wet during menstruation.
4. Febrile disorders, and some chronic intoxications such as morphiomania.
5. Some forms of cerebral disease.

The *diagnosis* of the cause of secondary amenorrhœa is always of importance because of the possibility of its being physiological. If menstruation ceases abruptly after it has been going on regularly and in undiminished quantity, pregnancy must be first thought of, even in the case of unmarried women and widows, and whatever the patient's station in life. The mode of onset of amenorrhœa due to anæmia is different; there is a history of a gradual diminution in quantity of the menstrual flow, which becomes very scanty before disappearing altogether; in addition, there is often a history of irregularity extending over several months or years. The existence of anæmia is readily determined by the history of shortness of breath, languor, and ready fatigue, taken in combination with pallor of the mucous membrane of the lips and conjunctivæ. When the symptoms and signs of anæmia co-exist with a history of scanty and irregular menstruation, it is permissible and often desirable to refrain from making any examination of the pelvic organs in the first instance. In the opposite conditions the breasts and abdomen should be examined, and if such examination is inconclusive a vaginal examination should be made. It must be remembered that suppression of the menses occurs not infrequently for a few months after the onset of puberty in perfectly healthy girls.

Amenorrhœa from catching cold or from febrile disturbances resembles that due to pregnancy in coming on abruptly, without previous diminution or irregularity, but in this case we have the history of the chill or the fever. A chill contracted at the onset of menstruation may result in the suppression of the flow for the remainder of the period, and in amenorrhœa for two or three months subsequently In this case some definite condition of pelvic inflammation is usually found. Diphtheria, small-pox, enteric, typhus, and scarlet fever may be followed by amenorrhœa of one to several months' duration.

The effect of lactation on the menstrual function varies. In some cases menstruation begins again some months after childbirth whether lactation be continued or not. In other cases lactation prolonged beyond a year may lead to superinvolution of the uterus, with the result that after the child has been weaned menstruation still remains in abeyance for some months. It is possible, indeed, that a premature menopause may set in from this cause.

The chief forms of cerebral disease causing amenorrhœa are cerebral tumours and insanity. It is especially with tumours of the base of the brain that this symptom is observed.

and the diagnosis of the cause of the amenorrhœa may be very difficult at first, because it may come on before the development of localizing symptoms. In cases of tumours of the pituitary body associated with acromegaly the amenorrhœa may be thought in the early stages to be due to myxœdema.

Insanity, especially melancholia, is frequently associated with amenorrhœa, and we may have to correct the impression of the patient's friends that return of menstruation will necessarily be followed by mental improvement. It is true that if the mental condition improves menstruation usually returns, indicating not that the amenorrhœa is the cause of the insanity, but that nutritive conditions, which were probably responsible for both symptoms, have improved. Return of menstruation without mental improvement makes the prognosis of the insanity unfavourable.

When amenorrhœa has resulted from myxœdema or morphiomania, return of menstruation is usually an indication of general improvement.

Treatment.—This resolves itself into the treatment of the cause of the amenorrhœa, and much that has been said under the head of the treatment of primary amenorrhœa is applicable here. When amenorrhœa is due to a chill a course of hot douches with glycerin tampons should be ordered, together with hot foot- or hip-baths administered before the period is due. In addition, some of the "uterine tonics," such as viburnum prunifolium, apiol, caulophyllin, or pulsatilla, may be given. The bowels must be attended to, saline purgatives being the best. The prognosis as to the re-establishment of menstruation is nearly alway good, except in some cases of cerebral tumour, myxœdema, insanity, and morphiomania.

Cryptomenorrhœa.—This subject has been fully dealt with when discussing the clinical aspects of malformations of the reproductive organs (see Chapter VII.).

CHAPTER XLV

DISORDERS OF MENSTRUATION—(*Continued*)

MENORRHAGIA AND METRORRHAGIA.

Menorrhagia.—This denotes excessive bleeding at the menstrual periods, and is a relative term. What is an ordinary menstrual flow in one woman may constitute menorrhagia in another. Some lose more in three days than others in seven or eight. So the loss sustained by a patient at any one time must be judged of in relation to the standard of her habitual menstruation type.

Metrorrhagia.—This signifies a discharge of blood from the uterus, independent of menstruation. Menorrhagia passes insensibly into metrorrhagia, and it is therefore convenient to consider the two conditions together. Many diseases lead at first to menorrhagia, and subsequently to metrorrhagia.

It is important to remember that menorrhagia and metrorrhagia are symptoms, not diseases, consequently no treatment should be attempted without endeavouring to ascertain their cause.

At the outset we must emphasize one important difference between these two symptoms : menorrhagia may be of functional origin, but metrorrhagia is always due to some organic condition.

An abundant menstrual discharge occurring once and limited to the period need cause no anxiety, but repetition of such hæmorrhage, or its prolongation into the intermenstrual period, necessitates an examination of the pelvic organs. The only admissible exception to this rule is in the case of young and unmarried girls and women; with them, if the hæmorrhage be not very severe and has not lasted long, it is permissible to postpone examination until drugs have had a trial. In all other cases the rule is urgent and imperative: *In all cases of uterine hæmorrhage a careful vaginal examination must be made.* The non-observance of this rule has often enabled uterine cancer to make such progress that when at last it is discovered there is no possibility of cure, whilst in other cases a polypus, whose removal at any time would have been most easy, has been allowed to blanch a woman to such an extent that months or years have been required to make up the lost ground.

Causes.—These may be enumerated as follows:

Menorrhagia.—1. *Constitutional Causes.*—Purpura, scorbutus, hæmophilia, hepatic cirrhosis, overindulgence in food and alcoholic drinks, and warm climates.

2. *Local Causes.*—Uterine congestion and displacements; endometritis, subinvolution, and retention of products of conception; uterine fibrosis; new growths of the uterus, such as mucous and fibroid polypus, adenoma, fibromyoma, sarcoma, carcinoma and chorio-epithelioma (deciduoma malignum); tubo-ovarian inflammation, especially when suppurative; some ovarian tumours.

Metrorrhagia.—There are no constitutional causes for metrorrhagia, which is always due to some disease of the uterus or appendages.

Local Causes.—Mucous or fibroid polypus; retention of products of conception; extra-uterine gestation; hæmorrhages connected with pregnancy; new growths of the uterus as above.

It may be remarked, incidentally, that hæmorrhages occurring during pregnancy, whether intra-uterine or extra-uterine, do not properly come under the category of metrorrhagia; for although etymologically the term means "flow from the womb," it has come to be used to indicate "intermenstrual" as distinguished from "menstrual" bleeding; and hæmorrhages during pregnancy cannot be described as "intermenstrual." It is, however, convenient to include such hæmorrhages here for the sake of completeness. Menorrhagia is an exaggeration of a physiological phenomenon; metrorrhagia, on the contrary, is essentially pathological.

Of the causes above enumerated, some never lead to anything more than menorrhagia; this is true of all the constitutional causes, and of some of the local ones, namely, uterine congestion and displacements, subinvolution, and some pathological conditions of the uterine appendages. In all these cases the proximate cause of menorrhagia is congestion, resulting in more extensive growth and breaking down of vessels, and more complete denudation of the uterine mucosa; in other words, the menstrual changes in the uterus are exaggerated. In all these conditions there is primarily no disease of the endometrium; later on the endometrium may become diseased owing to the constant repetition of excessive congestion, and it becomes thickened and hyperplasic. It is probable that under certain conditions marked retroversion of the uterus leads to twisting of the broad ligaments on their transverse axis, and consequent pressure on the veins contained therein, whilst the arteries are not affected, and congestion is increased by this means.

Menorrhagia brought about by other causes is from the first due to disease of the endometrium. Among such causes we may enumerate endometritis in all its forms, uterine fibrosis, retention of products of conception, and new growths. The mode of action of these varies; in some of them the uterus cannot properly contract and retract, owing to the presence of a foreign body in its interior—a good example of which is the retention of a piece of placenta. In other cases the muscular structures of the uterus are at fault; for instance, in uterine fibrosis the muscle tissue of the walls is largely replaced by fibrous tissue, and the vessels themselves are found thickened and fibrotic. Lastly, the bleeding may be due to ulceration exposing vessels as in the case of malignant growths.

Menorrhagia due to pathological conditions of the endometrium may pass on, almost insensibly, into metrorrhagia. That is to say, the monthly flow becomes at first prolonged; from four or six days it may extend to ten or twelve, and ultimately the hæmorrhage may become constant, with the exception, perhaps, of a few clear days here and there which bear no sort of relation to the monthly periods.

Diagnosis.—Menorrhagia and metrorrhagia are of the greatest possible importance as symptoms of organic disease. From the point of view of diagnosis, the age and sexual history of the patient will materially assist us. Accordingly cases of menorrhagia and metrorrhagia may conveniently be considered in two main groups, with minor subdivisions, according to certain salient features, which would be readily recognised if the inquiry were being conducted in the presence of an actual case.

Group 1.—*Cases in which the Patient is a Virgin.*—Below the age of twenty-five increase of the menstrual flow is most often the result of uterine congestion, which in turn may be due to cold or exposure during a period. Sometimes a mucous or glandular polypus will lead simply to menorrhagia, but much more frequently it produces metrorrhagia. This fact usually serves to distinguish hæmorrhage due to congestion from that which is due to a polypus.

At any age menorrhagia may be due to retroflexion of the uterus, combined with retroversion.

Above the age of twenty-five uterine fibroids begin to be an important factor, though they are not very often found before the age of thirty or thirty-five. At first a fibroid causes simply an increase in the quantity and duration of the monthly flow, and in the case of an interstitial fibroid this characteristic may remain even when the tumour is large. On the other hand, increase of size is often accompanied by intermenstrual hæmorrhage, and this is almost invariably the case when the tumour is submucous or polypoid. A subserous fibroid does not commonly affect the character of menstruation. Uterine congestion or endometritis may also lead to menorrhagia, and a mucous polypus to metrorrhagia at the age that we are considering.

Above the age of forty any of the above causes may be operative, and in addition we have to think of the possibility of malignant disease, especially carcinoma or sarcoma of the body of the uterus. Carcinoma of the cervix, on the other hand, is very rare in virgins. Malignant disease may develop before the age of forty, and this is especially the case with sarcoma. Hæmorrhage due to malignant disease takes the form of metrorrhagia.

We may sum up the above facts in a table as follows, the conditions put in brackets being rarer ones :

Age.	Menorrhagia.	Metrorrhagia.
Under 25	Uterine congestion Retroflexion and retroversion (Interstitial fibroid)	Mucous polypus (Submucous fibroid)
25 to 40	Uterine congestion Endometritis Retroflexion and retroversion Interstitial fibroid	Mucous polypus Submucous fibroid (Carcinoma or sarcoma of the body of the uterus)
Above 40	Interstitial fibroid Endometritis Uterine congestion Retroflexion and retroversion	Submucous myoma Mucous polypus Carcinoma of the body Sarcoma of the body (Carcinoma of the cervix)

The diagnosis must of course be reserved until the physical signs have been investigated, and this will be done either by bimanual examination or by exploration of the uterine cavity.

Group 2.—Cases in which the Patient is not a Virgin.—In this group we have two new factors introduced which may lead to hæmorrhage, namely, gonorrhœal infection and pregnancy and its sequelæ. To simplify the matter this group may be considered under three heads:

(*a*) *The Patient has never been Pregnant.*—When a patient who has been married but a short time gives a history of menorrhagia following on symptoms of gonorrhœal infection, such as purulent discharge and scalding micturition, she is probably suffering from pyosalpinx. In the absence of such infection, menorrhagia, accompanied by backache and leucorrhœa, points to uterine congestion, probably brought on by want of moderation in the sexual functions. Metrorrhagia coming on in the absence of any signs of pregnancy points to a polypus; slight metrorrhagia, accompanied by severe lateral pain, especially when following on a short period of amenorrhœa, must lead one to look for extra-uterine pregnancy. Menorrhagia, followed by metrorrhagia, in a woman over thirty-five will suggest uterine fibroid, whilst hæmorrhage occurring after forty is suspicious of malignant disease. In their tendency to the last two conditions, *married nulliparæ resemble unmarried women*; that is, they are prone to fibroids and to carcinoma or sarcoma of the body of the uterus, whilst they are relatively exempt from cancer of the cervix.

(*b*) *The Patient is Pregnant.*—As a rule hæmorrhage coming on after a few months of amenorrhœa points to a threatened abortion, and if profuse and accompanied by rhythmic pains the miscarriage may be regarded as inevitable. The possibility of a hydatid mole must also be remembered. Irregular hæmorrhage, small in quantity and dark in colour, following on a short period of amenorrhœa, may be due to tubal pregnancy. From the middle of the term of pregnancy onwards hæmorrhage may be due to placenta prævia or to partial detachment of the placenta. Occasionally carcinoma of the cervix complicates pregnancy, and causes metrorrhagia.

(c) *The Patient has been Pregnant.*—In cases of recent pregnancy menorrhagia may be due to subinvolution, but when associated with metrorrhagia the cause is often a piece of retained placenta. It must be remembered that the condition known as deciduoma malignum is characterized by metrorrhagia. When the patient is a multipara, and is over forty years of age, the bleeding may be due to cancer of the cervix or to endometritis. Multiparæ are also subject to uterine fibroids, but less frequently than nulliparæ. When hæmorrhage sets in some months or years after the menopause it is almost invariably due to carcinoma, but occasionally it arises from endometritis.

There is a wide-spread fallacy that irregular and profuse bleeding occurring in a woman at or near the time of the menopause is often due to physiological changes. This is not so. Such hæmorrhage is due to organic pathological conditions, mostly of a serious type in the great majority (about 95 per cent.) of cases; and the simpler explanation must never be assumed till other conditions have been definitely excluded, not only by ordinary examination, but by dilatation of the cervical canal, exploration of the uterine cavity, and, if necessary, microscopical examination of scrapings.

In both single and married women solid tumours of the ovary, especially carcinoma and sarcoma, may lead to menorrhagia, and the same result may occur when the pedicle of a benign tumour, cyst, or dermoid becomes twisted.

Traumatic hæmorrhages from the genital tract require no more than mention.

The hæmorrhages met with in married women may also be stated in tabular form, as follows :

	Menorrhagia.	Metrorrhagia.
Nulliparæ	Uterine congestion Pyosalpinx Uterine fibroid	Uterine polypus Uterine fibroid Carcinoma or sarcoma of the body (Carcinoma of the cervix) Extra-uterine pregnancy
During pregnancy	(Menstruation during pregnancy)	Threatened miscarriage Accidental hæmorrhage Placenta prævia Hydatid mole Tubal gestation (Carcinoma of the cervix)
After pregnancy	Subinvolution Endometritis Uterine fibroid Senile endometritis	Placental polypus Carcinoma of the cervix Uterine fibroid (Carcinoma or sarcoma of the body of the uterus)

Treatment.—When menorrhagia is due to constitutional conditions or to subinvolution, or when no definite local cause other than congestion can be assigned for it, medicinal measures are indicated. These, of course, include the special treatment of any defective general condition.

General hygiene must be considered. This includes moderation in food and drink, the avoidance of excessive fatigue, hot and badly-ventilated rooms, and too frequent sexual intercourse. The last is a frequent cause of uterine congestion and resulting menorrhagia.

Among uterine hæmostatics we may mention, in the first place, ergot and ergotin. The former is given in the form of liquid extract; usually drachm doses should be prescribed, as smaller doses may have very little effect. Ergotin is given in 3 grain doses, either in tabloid form or hypodermically. It is often useful to combine ergot with the tincture of hydrastis, or of hamamelis, in 15 to 20 minim doses, or these two drugs may be given together without ergot. A relatively recent uterine hæmostatic of great value is stypticin (cotarnine hydrochlorate), which may be given alone in 1 grain doses, or combined as in the following prescription, made up in palatinoid form : hydrastin hydrochlorate, $\frac{1}{3}$ grain ; ergotin, $\frac{3}{4}$ grain ; cannabin tannatis, $\frac{1}{2}$ grain ; stypticin, $\frac{1}{4}$ grain. Any of these preparations may be administered three times a day. It is advisable for the patient to begin taking the medicine two or three days or a week, according to circumstances, before the period is due. The same treatment may be carried out, at any rate as an adjunct or as a temporary expedient, in cases of metrorrhagia, but it must be remembered that whereas some cases of menorrhagia are due to conditions of congestion, and so yield to drugs, the great majority of cases of metrorrhagia are due to some definite pathological condition which requires operative treatment.

Among accessory measures in the treatment of menorrhagia an important place must be given to rest in bed, which should be maintained for the first two or three days of the flow, and to free purgation, which should be carried out before the period is due. Constipation is a potent factor in increasing pelvic congestion.

In cases of menorrhagia where the cause is local, and in all cases of metrorrhagia, the treatment will be that of the causal condition as described elsewhere under the appropriate heading.

CHAPTER XLVI

DISORDERS OF MENSTRUATION—(*Continued*)

DYSMENORRHŒA; MEMBRANOUS DYSMENORRHŒA AND INTERMENSTRUAL PAIN.

Dysmenorrhœa.—This means "painful menstruation," but we must qualify our definition, for 60 to 70 per cent. of women suffer pain during menstruation, and we cannot say that we have to deal with dysmenorrhœa in this proportion of cases.

Dysmenorrhœa affects women in different ways. In some the pain is abdominal, being referred more especially to the umbilicus and the hypogastric region below it, and it is then usually a kind of colic—a sharp "doubling-up" pain. With this is often associated pain shooting round the hips and down the thighs nearly to the knees, mainly in the area of distribution of the obturator nerve—that is, the inner side of the thigh. With others the pain is chiefly or entirely sacral—a dull aching pain low in the back, described sometimes "as if the back were going to break in two," and leading to a feeling of marked lassitude and weakness and a desire to sit or lie down. Or, again, the pain may be limited to one or other side of the abdomen in the iliac region, the position to which ovarian pain is referred. Lastly, the pain may be felt in all these regions at once, being described as "all round the lower part of the body."

The successful treatment of dysmenorrhœa depends in great measure on a recognition of its proximate cause, and tabulating the varieties of dysmenorrhœa on the basis of their origin, we can adopt the following simple classification :

A. Constitutional.
B. Local.
    1. Pelvic congestion.
    2. Faults of conformation.
    3. Faults of position.
    4. Pelvic inflammation.

A. *Constitutional Causes.*—These are to be regarded mainly as predisposing causes, and fall into two main divisions, malnutrition and neurosis. . In cases of malnutrition the patient shows general debility, and not infrequently the uterus is found to be smaller than normal. Overworked servants, shop-girls, and waitresses, who are liable to long hours of standing, underfed girls who live in unhealthy conditions of overcrowding and bad ventilation, are liable to this form of dysmenorrhœa. The neurotic form is found in neurasthenic girls, in overworked students and teachers, and in those of indolent habit of life, who supply a large proportion of the subjects of hysteria.

In the absence of local causes dysmenorrhœa of constitutional origin is spoken of as "functional." It is probably in reality akin to neuralgia, and arises from inadequate nerve nutrition. We might consequently very well call it neurasthenic dysmenorrhœa whether the subjects of it are neurotic or otherwise ill-nourished.

The effect of environment is illustrated by cases where girls suffer from dysmenorrhœa in London, though they menstruated painlessly when living in the country.

B. *Local Causes.*—1. *Pelvic Congestion.*—Dysmenorrhœa due to this cause is generally of the kind in which the pain is said to be all round the lower part of the body—in the back, sides, abdomen, and thighs. It generally begins a day or two before the onset of menstruation, and continues for the first day or two days of the flow. It is accompanied by a feeling of weight and bearing-down. The congestion is in many cases otherwise indicated by leucorrhœa in the intervals of menstruation, and the subjects of it nearly always suffer from chronic constipation. On examination marked pulsation of vessels in the vaginal vault may be felt; the uterus is often heavy and rather bulky, and the vulva is apt to become swollen during menstruation.

2. *Faults of Conformation.*—In cases of under-development, when the uterine canal is narrow and the walls unduly rigid, the swelling of the endometrium that precedes and accompanies menstruation may lead to pain. A uterus of this type is, in addition, not infrequently acutely flexed, either backwards or forwards, and there is stenosis of the os internum. Two forms of stenosis are found in association with these uterine conditions, namely, anatomical stenosis, which is either developmental or due to cicatrization after inflammation or to fibroid induration, and spasmodic stenosis, due to muscular contractions. In cases of stenosis, when the uterine sound is introduced, the patient sometimes complains of pain in the back, which she says is just like her menstrual pain, at the moment the sound is passing the os internum. Probably the passage of the sound induces reflex spasm, and so leads to pain. This form is sometimes called "spasmodic dysmenorrhœa." The term "obstructive dysmenorrhœa" has also been employed, but it is probably incorrect. If the stenosis were sufficient to cause "obstruction" we should expect to find accumulation of menstrual products behind the obstruction, with dilatation of the body of the uterus. It is doubtful whether either of these conditions is ever found; it is more probable that the pain is to be explained partly by the compression of the swollen mucosa as above stated, and

partly by the occurrence of painful uterine contractions, especially when there is marked flexion. This view is supported by the analogy of labour pains, which are also referred to the back. It is to be noted that many women menstruate painlessly in whom the uterus is markedly flexed, and, further, that dysmenorrhœa of this kind often supervenes some years after the onset of menstruation, the early years being quite free from pain, so the cause is probably complex. But whatever explanation we adopt the fact remains that dilatation of the cervical canal is followed by relief of the menstrual pain in a considerable proportion of cases.

3. *Faults of Position.*—Prolapse and retroversion of the uterus are frequently associated with dysmenorrhœa, and it is probable that the pain is in a considerable measure due to congestion. For in either case the free return of blood through the veins is hindered, as explained in the previous chapter. The pain is more constant when retroversion or prolapse is associated with prolapse of the ovaries into the recto-vaginal pouch ; we may then get the typical ovarian pain superadded to the pain referable to the uterus. *A fortiori*, the pain is more acute when congestion or inflammation complicates the prolapse of the ovaries.

4. *Pelvic Inflammation.*—This is a frequent cause of dysmenorrhœa in married women, and it may be intra-uterine and due to endometritis and metritis, or peri-uterine when it is the result of salpingitis, oöphoritis, and pelvic peritonitis. In the peri-uterine variety the uterus is more or less fixed in the midst of an inflammatory mass, and the increased uterine congestion of the menstrual periods and the hampered uterine contractions are alike sources of pain. Added to this there is the pain due directly to ovarian and peritoneal inflammation.

Diagnosis.—In the case of girls and unmarried women with no other symptom but pain it is undesirable to make a vaginal examination in the first instance as a matter of routine ; this should be reserved for cases in which medical treatment fails to give relief. Meanwhile the character of the pain and the quantity of blood lost will assist in the diagnosis. Thus painful and profuse menstruation is generally associated with great congestion before the flow begins, and the pain generally occurs during the congestive period—the commencement of the flow is then accompanied by a feeling of relief. When menstruation is painful and scanty the pain more often occurs during the flow, and has its origin in painful uterine contractions. The situation of the pain has also its significance; when this is in the back the cervix is generally at fault, and stenosis of the os internum, acute flexion, or cervical endometritis may be suspected. On the other hand, pain referred to the umbilicus is related to disturbance in the body of the uterus, especially in the fundus; it is analogous to after-pains, and is often associated with the passage of clots. Pain in the iliac fossæ is suggestive of ovarian inflammation or irritation, or of salpingitis. In the case of married women, and single women who have not been relieved by medicinal measures, an examination should be made in order to determine the presence of some anatomical cause for the dysmenorrhœa, such as those previously enumerated, namely, endometritis, flexions or displacements of the uterus, prolapse of the ovaries, inflammation or cystic growths of the ovaries, salpingitis, pyosalpinx, or general pelvic peritonitis with adhesions.

Treatment.—For constitutional or functional dysmenorrhœa the remedy lies in improved hygienic conditions, more exercise, plain and sufficient food, early hours, regularity of habits, with a definite occupation in some cases and restricted mental work in others. Among the medicinal measures for the relief of menstrual pain a foremost place must be given to aperients and purgatives, which should be administered a day or two before menstruation is expected. By this means congestion is much reduced. Hot foot-baths and sitz-baths are useful adjuncts. With regard to drugs, diffusible stimulants are useful in congestive cases, and they may be combined with sedatives, as in the following mixture: bromide of ammonium, 10 grains; solution of acetate of ammonia, 1 drachm, or aromatic spirits of ammonia, 20 minims; tincture of hyoscyamus, 1 drachm; chloroform water to 1 ounce; a few doses at intervals of three to four hours will usually give relief. Or the hyoscyamus may be combined with 10 minim doses of tincture of cannabis indica. Alcoholic stimulants, and especially gin, taken in hot water nearly always give relief, but for obvious reasons they must be ordered with great circumspection, and the same may be said of the preparations of opium, for the fostering of an alcohol or opium habit is a heavy price to pay for relief from dysmenorrhœa. Painful uterine contractions can be very satisfactorily relieved by phenalgin, ammonol, or phenacetin in 10 grain doses. The action of these drugs is best obtained when the patient lies down for half an hour afterwards. Although medicinal treatment generally gives relief, it is seldom curative; that is to say, it will usually require to be repeated at successive monthly periods.

Passing on to the treatment of local causes of dysmenorrhœa, we may consider first the case of faults of conformation, stenosis, and flexions. Dysmenorrhœa from these causes can often be relieved by dilatation of the uterine canal, preferably under anæsthesia.

When pain is caused by prolapse or retroversion of the uterus a well-fitting pessary will usually give relief. An obstinate retroversion, combined with retroflexion, that does not yield to pessaries, should be treated by hysteropexy; this often gives brilliant results, especially when the uterus has been held down by adhesions. Endometritis requires local applications to the endometrium or curetting according to its character and severity.

Congestion and the milder degrees of pelvic inflammation should be treated by hot douches given twice daily, and the introduction of glycerin tampons two or three times a week. The local applications must be supplemented by plenty of rest and regular attention to the bowels. In the severer kinds of pelvic inflammation the dysmenorrhœa is an incident rather than a leading feature, and the mode of treatment, whether medicinal, surgical, or expectant, will depend on the exact nature of the case, so that no general rules can be laid down.

In conclusion, it must be remembered that dysmenorrhœa, like menorrhagia and metrorrhagia, is in most cases only a symptom, the origin of which requires to be investigated; it is only in a minority of cases that it is present without any constitutional disturbance or anatomical pelvic condition to account for it.

Membranous Dysmenorrhœa.—This is the name given to a condition in which menstruation is very painful, and is characterized by the discharge of membrane from the uterus.

Nothing is known respecting its cause.

Pathological Anatomy.—When complete the membrane is a hollow cast of the interior of the uterus; it is the shape of an isosceles triangle, the base of which corresponds to the fundus of the uterus. At each of the truncated angles there is an opening, the small ones at the base indicating the position of the uterine ostia of the Fallopian tubes, and the larger apical opening marking the site of the os internum. A menstrual decidua is usually 2·3 centimetres in length, and 2 millimetres in thickness. The inner surface is smooth, and dotted with minute pits, the orifices of the uterine glands. The outer surface is shaggy, as is best seen when the membrane is floated out in water. Histologically, the membrane consists of recent blood-clot, characterized by the presence of a large excess of leucocytes; fragments of organized tissue are found, consisting of small round cells with a small amount of delicate fibrous stroma, and sometimes portions of shed and partially disintegrated epithelium. No glands are found, nor are the large decidual cells characteristic of the decidua of pregnancy present. The condition is best described as one of exfoliative menstrual endometritis.

Symptoms.—The patient complains of severe intermittent pain, beginning with the onset of the menstrual period, and reaching a maximum just before the expulsion of the membrane, after which the pain usually ceases. The membrane may come away whole, in several pieces, or in numerous shreds, and is usually discharged within forty-eight hours of the commencement of the menstrual flow.

Diagnosis.—The membranous cast must be distinguished from the decidua that comes away in cases of tubal pregnancy, or from the unimpregnated horn of a gravid uterus, and from the products of early abortion. The histological appearances will usually be decisive ; in addition to which, the history will generally serve for a diagnosis. In cases of deciduæ associated with pregnancy within or without the uterus there is always a history of one or more missed periods, except in some few cases of tubal gestation. The hæmorrhage in cases of membranous dysmenorrhœa is limited to the usual few days, whilst in cases where the membrane is decidual it may go on for one or several weeks. When the case has been under observation some time the regular painful discharge of membranes at monthly intervals is absolutely characteristic.

Treatment.—No drugs affect the formation of the membrane, although pain may be relieved by this means, as described in the previous chapter. The incidence of pregnancy sometimes effectually arrests the membranous formation, but not always. The best results are obtained from curetting, which affords at least a temporary relief ; but it may require to be repeated once or twice.

Intermenstrual Pain.—Under this designation has been described a condition called Mittelschmerz by German and some British writers, in which the patient experiences regularly recurrent pain in the intermenstrual periods. There may or may not be pain at the periods themselves.

Causation and Pathology.—This is as yet obscure. It has been attributed to recurring painful ovulation independent of menstruation. The more probable explanation is that it is due to painful efforts on the part of a diseased tube to expel its contents. In the majority of instances it has been found associated with tubal mischief, and especially with that curious condition known as intermittent hydrosalpinx. It is suggested that the uterine congestion which precedes menstruation causes occlusion of the uterine ostium, and accumulation of catarrhal contents in the tube ; the distension causes pain. When menstruation occurs, the congestion is relieved, the uterine ostium of the tube becomes patent, and the tube discharges its contents. Pain is then relieved.

Symptoms.—It is in harmony with the above explanation that a discharge of watery fluid occurs periodically in some cases of menstruation, and the tube, which had previously been felt to be enlarged, is now found flaccid. When these conditions are present, associated with the periodic intermenstrual pain, the diagnosis may be regarded as conclusive.

Treatment.—Abnormal conditions of the tubes may require to be dealt with surgically. In the absence of such signs the pain may be alleviated by drugs.

CHAPTER XLVII

DYSPAREUNIA: STERILITY

Dyspareunia.—This signifies pain during sexual intercourse. The causes may be classified as follows:

1. *Vaginismus.*—By this is meant a condition of painful and spasmodic reflex contractions of the muscles surrounding the vaginal orifice during coitus, or during a digital examination. The muscles chiefly at fault are the levators of the anus. It may be due to mere nervousness and hysteria, to hyperæsthesia of the vulva, or to one of the local pathological conditions enumerated below. The latter may, however, give rise to dyspareunia directly, and without producing vaginismus.

2. *Psychical Causes,* such as mere incompatibility or aversion when the marriage is unsuitable, nervousness or *mauvaise honte,* especially in the newly married. Dyspareunia from psychical causes may persist for months or years after marriage, and lead to much domestic unhappiness.

3. *Anatomical Causes.*—(*a*) Smallness of the vulva and vagina, congenital and due to under-development, or acquired, as the result of cicatricial contraction or atrophy of the vagina, or kraurosis vulvæ. In the first instance the obstacle may be a rigid hymen.

(*b*) *Inflammatory Conditions of Vulva, Vagina, or Urethra.*—Under this head may be enumerated vulvitis, vaginitis, and urethritis; ulcers, sores, and excoriations of the vulva or vagina; kraurosis vulvæ, an inflammatory condition of the hymen or carunculæ myrtiformes; inflamed Bartholinian glands; urethral caruncle. Piles will often produce a condition of vaginismus.

(c) More deep-seated conditions, such as metritis, pelvic inflammation, and prolapse of the ovaries. The last mentioned is a frequent unsuspected cause of dyspareunia; prolapsed ovaries are nearly always hyperæsthetic, and pressure upon them, whether during intercourse or during a vaginal examination, gives rise to acute pain.

Treatment.—The first essential is to discover the anatomical cause if one exists, otherwise time and effort may be wasted in the adoption of constitutional treatment when a simple local application may effect an immediate cure. Thus, in all inflammatory conditions, these must be treated by the methods described under their respective headings, and temporary sexual abstinence must be enjoined. When the vaginal orifice is small the use of simple lubricants such as vaseline may suffice; if not, it must be dilated with the fingers, or with dilators, preferably under an anæsthetic; a series of Fergusson's specula often answers very well. A rigid hymen should be incised, and a sensitive one excised. Simple vaginal hyperæsthesia may be relieved by a vaginal pessary containing ½ to 1 grain of cocaine, and made up with cacao butter; this is inserted ten to fifteen minutes before intercourse. Hyperæsthesia is also often improved by dilatation under an anæsthetic. Caruncles and cysts must be removed. Vaginismus due to kraurosis must be treated by anæsthetic local applications such as carbolic acid, cocaine, or menthol, or by dissection as described under Kraurosis (p. 89).

In the case of hysterical or nervous women constitutional remedies may be required, including sedatives such as bromides or hyoscyamus.

It must be remembered, however, that the cases where no local treatment is available are very rare, and include cases of "incompatibility," which are beyond the reach of medical intervention.

Sterility.—With causes of sterility affecting the man we have here nought to do, but they must never be lost sight of in investigating a case. For the want of carefully directed inquiry, the woman has not infrequently been erroneously held responsible for a childless marriage.

In considering sterility as it concerns women we must draw a broad distinction between—

(*a*) Conditions which do not allow of conception.

(*b*) Conditions which do allow of conception, but which do not allow of development.

(*a*) *Conditions which do not allow of Conception.*—(1) *Age.*—Save under exceptional circumstances conception does not occur before puberty. After this age fertility generally increases, attains its maximum at about the age of twenty-five, and then declines. Thus Matthews Duncan gave the following figures as the result of the analysis of 4,447 cases:

Age at marriage:	15-19;	20-24;	25-29;	30-34;	35-39;	40-44;	45-49;	50, etc.
Percentage sterile:	7·3;	0·—;	27·7;	37·5;	53·2;	90·9;	95·6;	100.

That is, in proportion as marriage is deferred the probability of sterility is increased. After the age of forty the chances of child-bearing are remote.

The following laws which Matthews Duncan enunciated are also worth bearing in mind:

The question of sterility is decided in three years of married life.

When the expectation of fertility is greatest the question of probable sterility is soonest decided, and *vice versa*.

Relative sterility will arrive after a shorter time according as the age at marriage is greater. A wife who, having had children, has ceased for three years to exhibit fertility has probably become relatively sterile—that is, will probably bear no more children—and the probability increases as time elapses.

(2) *Deficient Ovulation.*—When the ovaries are underdeveloped sterility is absolute. The atrophy which they undergo as time goes on has the same effect, and to this may be attributed the increasing sterility as the age of marriage is postponed. Ovarian disease, such as solid tumours and cysts, also leads to sterility. These conditions may generally be diagnosed by careful bimanual examination.

(3) *Deficient Uterine Changes.*—When the uterus is very small and menstruation absent or scanty, sterility nearly always results. This may be due in some cases to the concomitant deficiency of ovulation ; in others to the inability of the uterus to prepare for an oösperm (fertilized ovum). Delay or absence of menstruation cannot be regarded as an absolute indication of sterility.

(4) *Incomplete Sexual Intercourse.*—This may be due to narrowness of the vagina or to a rigid hymen. It must be remembered, however, that conception may occur when penetration has never taken place.

(5) *Mechanical Obstacles to Impregnation.*—Under this head are included all cases of atresia, whether of the vagina, of the internal or external os of the uterus, or of the Fallopian tube. The latter frequently becomes sealed up at its fimbriated extremity, as the result of pyosalpinx ; uterine atresia may also be due to disease, but congenital atresia is probably more common. Vaginal atresia is nearly always congenital. The mechanical obstacle may consist not in atresia, but in want of adaptation ; as, for example, in cases where the cervix is pointed markedly forward, either from retroversion or from anteflexion. The spermatozoa, which, as the result of intercourse, come to lie principally in the posterior vaginal

fornix, are then unable to make their way through the os externum, which is turned away from them. Polypi and other tumours in the genital passages may also be the cause of sterility.

(6) *Noxious Discharges.*—Septic and gonorrhœal discharges are injurious to the vitality of spermatozoa, and to this cause is probably partly due the sterility which is found in cases of gonorrhœa, endometritis, and adenomatous disease of the cervix. Gonorrhœa has perhaps an even more considerable effect in the changes which it induces in the Fallopian tubes. Strong antiseptic and frequent simple vaginal douches also prevent conception.

(*b*) *Conditions which allow of Conception, but which do not allow of Development of the Oösperm.*—Under this heading are included, first, the as yet obscure conditions which lead to extra-uterine gestation; and, secondly, pathological conditions of the uterus which cause early abortion, such as disease of the endometrium, extensive laceration of the cervix, and acute flexions of the uterus.

Treatment of Sterility.—It is most important that the practitioner should first ascertain whether the cause of sterility is remediable or not, for nothing leads to greater disappointment of the patient, and, we may add, to greater discredit to her attendant, than the confident holding out of a hope which is doomed to non-fulfilment. Therefore the development of the uterus and ovaries should be first investigated; if underdeveloped, treatment is useless, and no hope should be held out.

In cases of atresia the obstacle may often be overcome, as by division of a vaginal septum or by uterine dilatation. Correction of a malposition of the cervix will often be followed at once by conception.

With inflammatory conditions of the uterus there is a fair prospect of a favourable issue as the result of appropriate treatment, whether they have acted by preventing conception or by leading to early abortion. The same cannot, however, be said of tubal disease, where the prognosis is bad. But treatment should nevertheless be undertaken on conservative lines. Similarly, polypi and other tumours should be removed, the integrity of the uterus being preserved.

Harmful discharges will be removed by the treatment of the uterine or vaginal conditions which cause them.

Lastly, the conditions of intercourse must be inquired into, and the patient advised accordingly.

Sterility due to psychical causes is probably irremediable in most cases, but moral treatment is most likely to succeed. Here the judicious husband will probably be a better physician than the medical attendant.

CHAPTER XLVIII

DIAGNOSIS

Accurate diagnosis depends upon a systematic method of inquiry into symptoms and examination of physical signs. We shall here give an outline of the way such inquiry and examination should be set about.

The **anamnesis,** or account obtained by questioning the patient. The age, occupation, and civil condition should be first noted as a matter of routine, for these points may influence subsequent inquiries. We may then proceed in the following order:

(*a*) **Family History.**—The present health or cause of death of the nearest relations should be noted. A clue may thus be gained as to the probability of tuberculosis, syphilis, or neuroses in the patient's case.

(*b*) **Previous Health.**—Inquire concerning exanthemata or rheumatic fever in childhood, anæmia after puberty, syphilis or gonorrhœa after marriage, and previous treatment for disease of the pelvic organs. Thus a history of gonorrhœa, followed by repeated attacks of pelvic inflammation, will lead one to suspect tubal mischief, and it may explain the presence of vaginitis, endometritis, or a Bartholinian abscess. Tuberculosis may lead to the diagnosis of tuberculous peritonitis from other abdominal swellings or of tuberculous salpingitis when the tubes are affected; it may also clear up the nature of vulvar cutaneous affections. A history of operative treatment for dysmenorrhœa will prepare for the finding of congenital smallness or anteflexion of the uterus; whilst if the patient has worn pessaries, a present vaginitis or endometritis may be explained, or retroversion or hernia of the pelvic floor may be expected. So also the patient may have had curetting, trachelorrhaphy, amputation of the cervix, perineorrhaphy, or abdominal section performed, and these will all shed light on the present condition.

(*c*) **Menstruation.**—The age of the onset of menstruation, and of its cessation if the patient be past the menopause, should be noted; also its regularity, duration, the quantity of the flow as estimated by the number of diapers used, and its association with pain. It is important to ascertain whether the character of the menses has altered. Thus, if there has been a gradual diminution, followed by cessation, in a young woman, it is probably due to anæmia; diminution in an adult is often associated with ovarian tumours. Increase in the duration and quantity will point to pelvic congestion or inflammation, retention of products of conception, or some new growth, such as a polypus, a fibroid, or malignant disease. The diagnosis, especially between an ovarian tumour and a fibro-myoma, is often facilitated by a careful inquiry as to menstrual changes. Recent amenorrhœa, following on previous regularity, is always suggestive of pregnancy. When the menses have never appeared, and the patient has reached adult life, there is a likelihood of congenital malformation, with or without retention of menstrual products.

(*d*) **Confinements; Miscarriages.**—The patient may give a history of sterility after several or many years of married life. This, especially if associated with dysmenorrhœa, will lead one to suspect under-development of the uterus, or if there is at the same time a history of gonorrhœa, there is considerable probability of disease of the uterine appendages. This probability is increased if the sterility has supervened after a single pregnancy, or after one or two miscarriages;

whilst endometritis will at the same time be looked out for. Relative sterility, when there has been no gonorrhœal disease, and when the menstrual loss has increased, will prepare one to find fibroid changes.

Repeated miscarriages in early married life, followed by delivery of a viable child, usually point to syphilis. Repeated miscarriages coming on after the birth of several living children may be due to inflammation or displacement of the uterus or laceration of the cervix, or to a tuberculous diathesis (Taylor).

When the patient is a multipara who has had several difficult or instrumental labours one is likely to find a laceration of the cervix, or a rupture of the perineum with its attendant symptoms of hernia of the pelvic floor.

Recent instrumental or otherwise abnormal labour followed by severe illness often means pelvic inflammation, either peritonitis or cellulitis; on the other hand, this may follow a labour that has been apparently normal, and may be due to the reawakening of a dormant infection in the vagina, uterus, or Fallopian tubes, to a suppurating ovarian cyst, or to secondary changes in a dermoid.

Metrorrhagia or menorrhagia dating from a miscarriage or from a labour at term is most often due to the retention of portions of placenta or membranes.

Various vulvar affections, such as œdema, hæmatoma, and cellulitis, may owe their origin to a recent labour.

(*e*) **The history of the present illness** should next be inquired into so as to obtain an idea as to its mode of origin and duration. A good deal of care is necessary in elucidating this, as the patient's statements are often not only vague but contradictory. Bleeding that has lasted a month may be due to miscarriage; irregular bleeding for two or three months may indicate tubal gestation or cancer; bleeding that has gone on for many months is more likely to be due to a polypus or to a fibroid. So also a tumour that has existed many months without much increase in size cannot be due to normal pregnancy. An illness that has come on suddenly with severe pain generally indicates pelvic inflammation, but it may also be due to tubal gestation, to the rupture of a cyst, or to torsion of a pedicle. The history of new growths is a gradual onset, whilst conditions such as chronic endometritis and uterine displacements have probably existed off and on for several years. The history of tubal disease is generally that of chronic ill-health with periodic exacerbations.

(*f*) **Present Symptoms.**—In the out-patient room and in the consulting-room the symptoms will generally be ascertained at the outset, but in "taking out a case" in hospital it is best to first obtain the previous history. In many gynæcological conditions the symptoms present a marked similarity; thus, pain referred to the sacrum or hypogastrium, and pains on sitting or walking, leucorrhœa, menorrhagia, and dysmenorrhœa, may be met with in the most varied diseases. We shall attempt, however, to analyze them to some extent in order to estimate the value to be attached to them in forming a diagnosis.

Pain.—This, when referred to the umbilicus and hypogastrium in front and to the sacrum behind, generally indicates uterine disorder. It is found characteristically as dysmenorrhœa. It is said that the pain may be further localized, and that sacral pain has its origin in cervical conditions, whilst when the fundus is involved the pain is referred to the umbilicus (see p. 413). A sense of aching, fulness, and ill-defined weight, often summed up by the patient as "bearing-down pain," is associated with pelvic congestion, and also with dragging on the uterine attachments, as in cases of prolapse and of retroversion of a heavy fundus.

Pain in the iliac regions and shooting down the thighs is often due to congestion or inflammation of the uterine appendages, but it is also a frequent manifestation of neurasthenia, when it may be called neuralgic.

The above kinds of pain may occur irregularly or almost continuously; they may come on as a result of long standing or much walking, and they are then worse in the evening. Or they may be limited to the menstrual periods.

Lastly, pain may come on suddenly and acutely. When it is situated in the iliac region the most frequent causes are rupture of an ovarian cyst, pyosalpinx, tubal gestation, or torsion of the pedicle of an ovarian tumour or cyst. A sudden pain referred to the back sometimes marks the occurrence of displacement or of inversion of the uterus as the result of a fall or strain.

General acute abdominal pain is usually due to the onset of pelvic inflammation.

Leucorrhœa.—The character of the discharges should be carefully inquired into, and the account given by the patient may often be confirmed by the subsequent examination. The information to be derived therefrom has already been given in discussing the secretions (Chapter XIII.).

Menorrhagia and Metrorrhagia.—The significance of these is described in Chapter XLV.

Rectal and Vesical Symptoms.—Straining at stool, tenesmus, and pain preceding and during the action of the bowels are generally due to pressure on the rectum due to retroversion of the uterus, to pelvic inflammation, or to a tumour situated more especially at the back or left side of the pelvis. Such a tumour may consist of a subperitoneal myoma, a uniform enlargement of the uterus from fibro-myoma or pregnancy, an ovarian cyst in the recto-vaginal pouch, or a cyst in the left broad ligament. Constipation is favoured also by these conditions, and the pain is then aggravated by the hardness of the motions. A prolapsed and inflamed left ovary is very liable to cause an acute and sickening pain during defæcation. When the patient complains of "bearing down in the back passage" piles are often found, due in part to constipation and pelvic congestion.

The principal bladder symptoms are frequency of micturition, incontinence, retention of urine, and burning pain on passing water; both frequency and incontinence may be of nervous origin and occur in anæmic and neurotic girls. In such cases the absence of organic cause for the symptoms is shown by the relief which follows simple hydrostatic dilatation of the bladder. In other cases these conditions arise from moderate pressure on the neck of the bladder causing continual irritation. If the pressure be greater, retention results, and later the overflow due to retention—*i.e.*, a spurious incontinence. The conditions which give rise to pressure are retroversion of a gravid or otherwise enlarged uterus, cervix fibroids, pelvic inflammation, and the jamming of the uterus against the pubes by a growth filling the recto-vaginal fossa. Burning pain on passing water is always found with gonorrhœal urethritis, and it may occur also from non-gonorrhœal leucorrhœal discharges, causing peri-urethral excoriation and irritation, and from the presence of an urethral caruncle.

General Symptoms.—Under this heading are included symptoms other than pelvic; thus, a patient with amenorrhœa may complain of palpitation and shortness of breath due to anæmia—amenorrhœa due to this cause does not of course require a vaginal examination. Or the complaint may be reflex functional disorders, such as vomiting, disordered vision, epilepsy, or other neuroses. These will necessitate the preliminary examination of the organs to which the symptoms are referred; if these organs be normal, an explanation must be sought in the pelvis.

Weakness, headache, anorexia, etc., occur in almost all cases where the general health is affected, so that they have but little diagnostic value, but loss of flesh in addition may give a clue to the presence of tuberculosis or malignant disease.

The pulse-rate and temperature should be noted when necessary, because when these are raised they will assist in diagnosing inflammatory from non-inflammatory conditions in the pelvis.

The evidence to be obtained by questioning the patient has been set forth in some detail, not with a view to replacing physical examination, for symptoms are proverbially unreliable, but rather to suggest possibilities and direct the course of further examination. Many things are missed simply because one is not on the look-out for them, whilst, on the other hand, it is in a measure true in medicine that "the eye sees that which it brings with it the power to see." Consequently, during the process of diagnosis all possibilities should be arrayed and retained before the mind until one after another is definitely excluded as examination proceeds. By this means little will be missed, though at the same time there may be left in the mind at the conclusion of examination an uncertainty as to which of two or three conditions is actually present.

CHAPTER XLIX

DIAGNOSIS—(*Continued*)

THE PHYSICAL EXAMINATION.

(*a*) *General Health and Appearance.*—The information to be gained under this head comprises (1) evidences of fever, as indicated by pulse and temperature, by extra dryness of the skin, or by sweating; (2) evidences of wasting; (3) indications of the general nutrition of the body. In the face we shall read signs of anæmia, jaundice, cachexia, habitual suffering, or anasarca. There may be œdema of the lower limbs, or varicose veins, indicating backward pressure in thorax, abdomen, or pelvis. General signs of under-development may be noted, such as a childish face, smallness of the breasts, a narrow pelvis, and deficiency of pubic hair. Dark mammary areolæ and the presence of milky secretion in the breasts may give useful information as to a previous or present pregnancy.

(*b*) *Condition of the Cardiac, Respiratory, Digestive, Excretory, and Nervous Systems.*—This part of the examination need not always be made exhaustively, but no well-marked pathological condition should ever be overlooked. Thus, when there has been sudden pain or collapse, a perforated gastric ulcer, or appendix abscess, or a gall-bladder with impacted stone may require to be diagnosed from tubal gestation, a ruptured cyst or pyosalpinx. Renal or biliary colic may simulate pelvic pain.

(*c*) *The Abdomen.*—Note the presence of striæ as indicating former distension, and dilatation of superficial veins as evidence of intra-abdominal pressure.

Swelling of the abdomen may be due to the following conditions :

1. Causing uniform or regular enlargement : Deposition of fat, especially at the menopause ; distension due to flatus ; ascites and tubercular peritonitis ; pregnancy ; uniform enlargement of the uterus from fibromyoma ; large ovarian tumours ; large hydronephrosis.

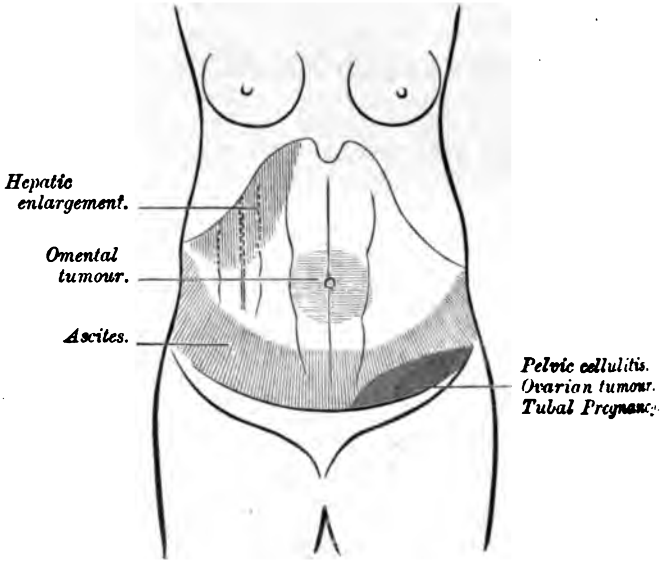


FIG. 120.—DIAGRAM TO INDICATE THE POSITIONS OF ABDOMINAL SWELLINGS.

2. Causing irregular enlargement : Small ovarian tumours ; encysted peritoneal effusions ; fibroids ; moderate enlargement of kidney from hydronephrosis or new growth ; movable kidney ; enlarged spleen ; omental tumours ; malignant disease of the intestines ; ectopic gestation (Figs. 120, 121).

We must begin by excluding the first two conditions. For the determination of mere obesity, palpation and percussion will generally suffice, especially under an anæsthetic. Ascites is indicated by the absence of definite limits, the dulness in the flanks and hypochondrium with resonance in the epigastrium, the line of dulness having a margin concave toward the umbilicus, and the variations in dulness on altering the position of the patient. An encysted collection of peritoneal fluid may, however, have fairly definite margins, unaltered by the position of the patient, and may lie excentrically.

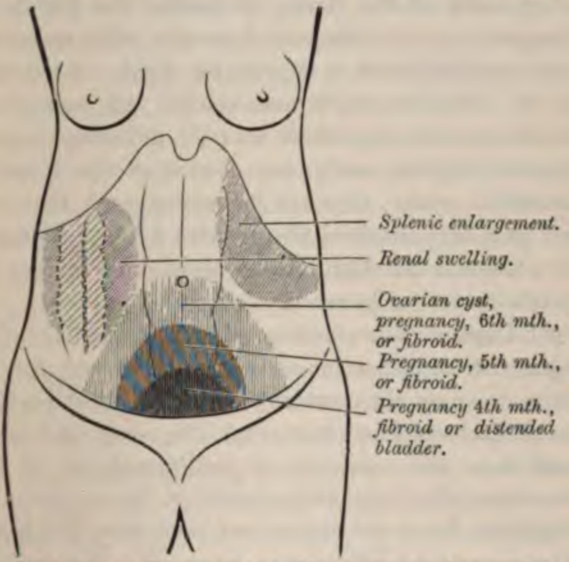

Splenic enlargement.
Renal swelling.
Ovarian cyst, pregnancy, 6th mth., or fibroid.
Pregnancy, 5th mth., or fibroid.
Pregnancy 4th mth., fibroid or distended bladder.

FIG. 121.—DIAGRAM TO INDICATE THE POSITIONS OF ABDOMINAL SWELLINGS.

The next question is, Does the swelling originate in the pelvis ? If so palpation cannot reach its lower margin. If we find the swelling median and uniform it is probably a gravid uterus, a uterine fibroid, or a large ovarian tumour ;

if arising laterally it may be a small ovarian tumour, a fibromyoma, an ectopic gestation, or pelvic inflammation.

If, on the other hand, the lower limit can be defined, we usually have to do with an abdominal tumour. If left-sided, smooth, passing up under the left costal margin, and superficially dull, it is probably spleen. A corresponding condition on the right side may indicate a distended gall-bladder or enlargement of the liver. If nearer the middle line, and disappearing under the costal margin, with an area of resonance superficial to it, it is probably renal. A movable kidney will be definable above and below. An isolated and well-defined tumour somewhere near the umbilicus is probably an omental tumour, malignant disease of the intestines, or a pancreatic cyst. It must be remembered that an ovarian cyst or a subperitoneal fibroid with a long pedicle may be in the abdomen and simulate an abdominal tumour; its lower margin may then be readily definable.

(*d*) *Vaginal Examination.*—It is frequently advisable to begin with an inspection of the genital organs, for, in the first place, we may thus avoid the risk of infection from gonorrhœal discharges and from syphilitic sores, and, secondly, we shall note the existence of malformations of the vulva, cutaneous affections, enlargement of the nymphæ (indicating irritation), kraurosis vulvæ, and laceration of the perineum—these present no difficulty in diagnosis. We shall also determine the presence of swelling in the vulva, such as hæmatoma, labial cysts, labial abscess, etc.

On introducing the finger, we note the condition of the hymen, and the pain and spasm so induced may indicate vaginismus. At this stage the character of the secretion should be observed: if muco-purulent we shall find inflammation higher up; if malodorous we may have to do with carcinoma, a sloughing fibroid, a polypus, or a retained pessary.

If we find the vaginal walls protruding the case is probably one of cystocele or rectocele, and this may be confirmed, if necessary, by passing a sound into the urethra or the finger into the rectum.

Heat and dryness of the vagina indicate pelvic inflammation; heat and great moisture indicate vaginitis or pelvic congestion; the latter may be due to pregnancy, in which case we shall find the well-known purple coloration.

Marked pulsation of the vaginal vessels is most often due to pregnancy or uterine fibroid; if confined to one fornix there is probably tubal disease or tubal gestation.

At this stage we shall discover swellings in the vagina due to cysts or to lateral hæmatometra; the exact diagnosis will probably require aspiration with a fine trocar. Growths affecting the vagina will be recognised without difficulty, but we may find other things projecting, such as polypus or an inverted uterus, which must be investigated as previously described. The condition of the cervix next occupies us—lacerations, erosion, faulty position, softness due to pregnancy, malformations, cancer, the patulousness or otherwise of the os externum. If the cervix be normal in these respects we proceed at once to ascertain the position, mobility, and size of the uterus by bimanual examination. If the position be faulty it may be due to a simple displacement, to pelvic inflammation, or to the distortion produced by a tumour pressing on it; impaired mobility may also be due to one of the last two conditions. If pelvic inflammation be present it will be indicated by the board-like hardness converting the structures at the summit of the vagina into a kind of firm roof. The position and limits of the effusion are determined by bimanual examination, and the parts will usually be very tender to manipulation. A large, soft, movable uterus is nearly always indicative of pregnancy; this may be simulated by a soft fibromyoma, and in diagnosing the condition we shall have to be guided by the history, especially the suppression or increase of menstruation, and by the age of the patient, for fibro-cystic tumours generally occur after forty, whilst pregnancy is then less common. The possibility of hæmatometra in one-half of a double uterus or in the single organ must be borne in mind. If pregnancy can be excluded the sound may be passed, and this will show whether and how much the uterus is enlarged. If it passes not more than 3½ inches the enlargement may be due to subinvolution, chronic metritis, hypertrophy of the cervix, a small polypus or retained products of conception. To further determine which of these conditions is present the cervix must be dilated and the uterine cavity explored with the finger. If the sound passes from 3½ to 6 inches we have to do with a fibromyoma of the uterus as a rule. But sarcoma and carcinoma of the body of the uterus may also cause considerable enlargement; the free bleeding on passing the sound will give a clue; and, in addition, the uterus may be more or less fixed. It must be remembered also that in lateral hæmatometra the patent half of the uterus may be considerably elongated.

Supposing the uterus to be fairly normal, we next examine the adnexa. An endeavour should first be made to trace the Fallopian tubes from the cornua of the uterus outward. If normal they will be felt bimanually as cord-like structures, and in some part of their course we shall meet the ovaries, whose position will be generally indicated by their tenderness to pressure and the shrinking of the patient. If enlarged the tubes will be felt as elongated swellings; the thickening may extend right up to the uterus, or it may affect principally the distal portions. At the same time a small ovarian cyst or a distended tube may be discovered. Enlargement of the ovaries, tubes, and broad ligaments can often be more distinctly felt, and their limits better ascertained by recto-abdominal examination. Sometimes tubal and ovarian swellings are found occupying the pouch of Douglas, which they may depress so as to obliterate the posterior vaginal fornix. A mass is then felt behind the vagina, and rectal examination may be necessary to determine whether the mass is between the vagina and rectum or in the rectum itself, for scybala in the rectum give much the same sensation. And here we may remark that the feeling of a swelling in the pouch of Douglas, or in the left broad ligament, may be so closely simulated by malignant disease affecting the sigmoid flexure that a rectal examination is necessary to clear up the diagnosis. It is often impossible to distinguish between tubal disease and small ovarian or broad-ligament cysts. When double, and following on an attack of gonorrhœa, the probability is in favour of tubal disease, but bilateral ovarian cysts are not uncommon. It is then sometimes possible to feel the tube passing over the swelling, or, when the tubes are affected, the ovaries may be felt separately. On the right side tubal disease is often closely simulated by disease of the vermiform appendix. The history will serve as a guide, but sometimes the diagnosis can only be made after the abdomen is opened.

The consistency of a small pelvic tumour is often very misleading, so that a tense cyst may be mistaken for an outlying myoma, and *vice versa*. When a mass of some size occupies the recto-vaginal pouch we may have to distinguish between a cyst, an enlarged retroverted uterus, a subperitoneal fibroid, and a hæmatocele. If the passage of the sound be contra-indicated the diagnosis is sometimes difficult, but careful examination under an anæsthetic may enable us to feel the fundus of the uterus distinct from the tumour. A hæmatocele under such circumstances will generally be due to rupture and subsequent encystment of a tubal gestation, but it may also be due to tubal abortion.

Tubal disease, extra-uterine gestation, and small cysts, especially when suppurating, may be complicated by pelvic inflammation; it will then be necessary to wait until this is partly absorbed before the nature of the original swelling can be made out.

In the case of large pelvic tumours the diagnosis lies principally between fibromyomata of the uterus and ovarian cysts. The latter may be partly solid or the former fibro-cystic, when the difficulty will be increased. The menstrual history is here of great service, for increase of menstruation is the rule in fibromyomata, cystic or otherwise, while it is the exception in the case of ovarian tumours. For further diagnosis we may pass the sound; if the uterine cavity be of normal length the tumour is extra-uterine. And the same may usually be said when the tumour can be moved independently of the uterus, though at times a subperitoneal fibroid may have a long thin pedicle. If the fundus can be felt bimanually independent of the tumour, as can often be made out under an anæsthetic, the tumour is probably ovarian; it will generally be found in such a case that the fundus has been jammed up against the pubes or backward into the cavity of the sacrum by the growing tumour. It must be remembered that an ovarian tumour and a uterine fibroid sometimes coexist, that either may be found complicating pregnancy, and that in rare cases any one of the three may be found in connection with a double uterus. In all these cases the diagnosis is very difficult, and no general rules can be laid down. Cœliotomy will probably be required before an exact diagnosis can be made.

We have not attempted to do more than give an outline of the principles of diagnosis in examining the female genital organs, and, in conclusion, we should like to emphasize three points:

Firstly, the necessity of exploration of the cavity of the uterus when symptoms point to intra-uterine mischief and the cervix is comparatively normal.

Secondly, the great advantage to be gained by combining a rectal examination with the bimanual method.

Thirdly, the importance of an examination under an anæsthetic in all cases of doubt. By this means the abdominal muscles are relaxed, the resistance of the patient due to pain and tenderness is obviated, and, perhaps most important of all, the examination can be made in the lithotomy position, which is the only position in which all parts of the pelvis can be thoroughly explored in their natural relations.

CHAPTER L

GYNÆCOLOGICAL OPERATIONS

GROUP I.—VAGINAL.

THIS group will include operations on the **perineum** (perineorrhaphy); on the **vulva**, such as removal of urethral caruncle, the clitoris, tumours, and cysts of the labia; such procedures on the **vagina** as the repair of fistulæ, the relief of atresia of the genital passage, and colporrhaphy; colpotomy; and operations on the **uterus**, such as dilatation and curetting, trachelorrhaphy, amputation of the cervix, removal of polypi, myomectomy, and vaginal hysterectomy.

Gynæcological operations demand for their successful performance the same qualities of head and hand as are necessary for carrying out operations in other regions of the body. The individual ambitious for success in operative gynæcology must possess a sound practical knowledge of pelvic anatomy and pathology, and carry out rigidly all the details of what is known as aseptic surgery. The more thoroughly he attends to the preliminary preparation of the patient, the selection of the room and surroundings, and the more care he devotes to the sterilization of the instruments and materials employed in operations, *and his hands*, the greater will be his measure of success.

To facilitate the sterilization of instruments it is now usual to have them made of metal throughout. Of course all cutting instruments are made of steel, but knives may be fitted to handles which are coated with nickel, so that they retain their brightness.

It is assumed that the student before he begins the study of gynæcology has been a dresser, and is already familiar with the common tools of surgery, such as knives, dissecting-forceps, artery-forceps, pressure-forceps, needle-holders, retractors, and the like. He should also be familiar with the various kinds of material employed to secure bloodvessels and wounds, such as catgut, fishing or silkworm gut and silk. His occupation of dresser will have made him acquainted with the various kinds of material used as dressings for wounds.

Although a large number of gynæcological operations may be carried out with the assistance of the implements employed in general surgery, nevertheless there are certain instruments indispensable to the performance of vaginal operations. Some of these, such as the speculum, the uterine sound, and the volsella, have already been described in Chapter III. Others will be considered with the operations in which they are of special service.

The student should realize that it is part of his duty to make himself familiar with the names of the instruments as well as to understand their use. If he has the least taste for mechanics there is much to interest him in the construction of surgical instruments, and there is need also for improvement. The names of some great surgeons, famous in their day for operative ability, are saved from utter oblivion by the fact of being associated with the invention or improvement of some useful instrument of surgery. Thus the history of instruments employed in special departments of surgery is indirectly the history of the speciality.

In gynæcology, as in other departments of surgery, many operations are carried out upon definite principles—the outcome of the accumulated experience of many operators. The student, however, should remember that the description of an operation is, in fact, merely a narration of principles; the details require modification according to the necessities of the case and the complications which may arise during its performance.

Before embarking upon an operation the surgeon should satisfy himself that the patient has no constitutional defect likely to mitigate against success. Thus chronic renal disease, diabetes, leucocythæmia, hæmophilia, malaria, chronic alcoholism, and visceral disease are conditions which need to be carefully considered in advising patients to submit to operations which are not urgently necessary. In grave conditions where life is in imminent peril, where nothing short of operation (so far as human foresight enables one to judge) holds out any prospect of prolonging life, then the constitutional defect is not allowed to bar operative interference.

In arranging for operation in women during the sexual period of life there is one function almost invariably to be considered—namely, menstruation.

Operative procedures on the external genital passages are barred during menstruation, and, as a rule, the patients themselves fix the day of operation according to their knowledge of the expected appearance or disappearance of the menstrual flow. It must, however, be borne in mind that with many women the anxiety occasioned by an expected operation will defer or even arrest a menstrual period, but more frequently causes it to anticipate the regular date.

When a woman is suffering from an intra-uterine fibroid carcinoma, or retained products of conception, uterine bleeding is no obstacle to operation, but necessitates it.

In abdominal operations, such as ovariotomy or oöphorectomy, it is the rule not to operate during menstruation, but occasionally the environment of a patient is such that the surgeon neglects to regard it. Operations of this kind performed during menstruation do very well, and we have never seen anything untoward arise in such circumstances.

The ensuing accounts of operations will not be merely descriptions of the methods of performing them, but will contain information concerning the various sequelæ and remote effects, as well as the immediate risks to life.

In order to prevent repetition it will be useful to describe the preliminary preparation of the patient.

In all operations belonging to this group it is important to secure the services of a nurse who has had a gynæcological training. Such a nurse understands the methods of washing and disinfecting the vagina, is apt at passing the catheter, and without fuss arranges the patient and prepares the needful apparatus. For any operation under an anæsthetic the patient should abstain from food for at least four hours—six is preferable; this not only prevents vomiting during the exhibition of the drug, but diminishes the chances of its occurrence on the return to bed. As in other cases, the rectum should be thoroughly emptied by an enema some hours before the time fixed for the operation.

It is good practice to have the nurse in attendance upon the patient at least forty-eight hours before operation; they grow accustomed to each other, and the nurse is able to douche the vagina systematically—an important matter when there is a purulent or offensive discharge. In ordinary cases a douche, morning and evening, of a quart of warm water lightly tinged with permanganate of potash answers every purpose. When the discharges are offensive then it will be necessary to employ a lotion of perchloride of mercury (1 : 5000).

The room (when there is opportunity for choice) should be well lighted and well ventilated. If near a bath-room or water-closet, the surgeon should satisfy himself that these offices are in a sanitary condition.

In all vaginal operations the patient lies upon her back, fixed in what is known as the lithotomy position by means of the crutch, or by means of leg-rests attached to the operating table. Her buttocks are brought well to the edge of the table, and a piece of waterproof sheeting adjusted so as to convey any fluid discharges into a convenient receptacle. The table should be so arranged as to face a window free from the encumbrance of thick blinds or curtains.

Every well-trained nurse in arranging for a vaginal operation prepares the following things: a firm and convenient table, waterproof sheeting, a dozen towels, plenty of warm water, douche-can, aseptic cotton-wool dabs, two glass catheters, some good brandy, vessels in which to immerse the instruments, antiseptic lotions according to instructions, vaseline or glycerine, and tampons.

In the performance of vaginal operations certain instruments are indispensable, and it will save much repetition to enumerate them.

The Crutch.—This invaluable instrument consists of two stout semicircular bands fitted with leather straps and buckles for grasping the legs just below the knees; the bands are fitted to a sliding crossbar of iron, which can be lengthened at will by means of a thumbscrew. When fixed to the legs the patient can be secured in the lithotomy position by a broad strap passing obliquely around the shoulders.

A very useful instrument in vaginal operations is *Auvard's speculum*. It is on the principle of Sims' speculum, but is made "self-retaining" by means of a weight on the handle. The handle itself is grooved, so that it can be used as a conduit for fluids when the vagina is being douched; it can only be used with the patient in the lithotomy position.

Other instruments required for nearly all vaginal operations are: the uterine sound for determining the length of the uterine cavity and the position of the uterus, the vesical sound to indicate the position of the bladder, volsellæ for manipulating the uterine cervix, sponge-holders, sterilizer.

The Sterilizer.—This instrument is made of copper and stands on four legs, which leave sufficient space for a spirit-lamp or gas-jet to be placed underneath. The sterilizer is half filled with hot water, the instruments placed in the wire basket, immersed in the water, the lid is closed, and the boiling maintained for twenty minutes. A new fish-kettle makes an excellent sterilizer.

In describing the various vaginal operations and in enumerating the requisite instruments, it will be assumed that the operator is already furnished with those mentioned in the above list.

Gloves.—In abdominal operations the surgeon should be especially careful of his hands, for they are a notorious source of danger.

Nothing should be allowed inside a patient's abdomen that has not been boiled specially for the operation, and as the surgeon's hands cannot be sterilized by heat he should wear rubber gloves which have been boiled.

CHAPTER LI

OPERATIONS ON THE PERINEUM, VULVA, AND VAGINA

PERINEORRHAPHY; REMOVAL OF URETHRAL CARUNCLE; REMOVAL OF CLITORIS; COLPORRHAPHY; AND FOR VAGINAL FISTULÆ.

Perineorrhaphy.—Under this term are included the various operations performed for the repair of lacerations of the perineal body in the female.

Many methods of operating have been devised for this purpose, but they have been greatly modified in the last fifteen years, with the result that it has become one of the simplest, safest, and most certain of all gynæcological operations, providing care is exercised in the preparation of the patient, in the details of the operation and in the after-treatment.

Perineorrhaphy may be described in two sections:

1. When the laceration is partial.
2. When the laceration is complete.

Preparation of the Patient.—To ensure success it is necessary that the patient be confined to bed for a few days, and her bowels should be thoroughly and regularly evacuated. The vagina is douched twice daily with a mild antiseptic solution, and if there be endometritis it is advisable to carry out a preliminary curetting, as harmful discharges from the uterus interfere with healing.

Instruments required in addition to those enumerated on

p. 444: Scissors, angular and flat, hæmostatic forceps, fine silk, silkworm-gut, perforated shot and coils, needles in handles, and a shot compressor.

Partial Perineorrhaphy.—This is the operation for the repair of a partial laceration. The patient being anæsthetized and placed in the lithotomy position, the lower portions of the vulva are shaved. A vaginal douche is given, and the vagina is cleansed by thorough swabbing. Two fingers of the left hand are introduced into the rectum to put the parts on the stretch. The necessary incision is shown in Fig. 122, and is made by means of sharp-pointed angular scissors introduced in the middle line and carried forward in a curve on each side, skirting the line of junction of skin and mucous membrane, as far forward as the posterior extremity of the labia minora. The incision should end towards the *inner* side of the labia minora, and the anterior extremities of the two halves of the incision should be exactly opposite one another. The flap so marked out is raised as in Fig. 123. To assist in this step an assistant should hold the flap in the middle of its posterior border with forceps. In the figure it is shown held up by a thread. During the dissection, which splits the recto-vaginal septum, the operator must be careful neither to button-hole the flap nor to let the scissors cut into the rectum; and therefore it is better to use scissors with rounded points for this stage of the operation. It is important that the flap should be well freed at its upper lateral portions. The next step is the introduction of the sutures. These may consist of silk or silkworm-gut, threaded on a needle with a large curve, which is introduced at the margin of the incision; it is passed deeply under the wound, and made to emerge at the corresponding point on the opposite side. Great care is necessary not to pierce the rectum; the fingers, which have not so far been removed from the rectum, act as a guide. Three to five sutures are passed in this way, according to the extent of the laceration; the most anterior one should correspond to the anterior limit of the incision (Fig. 123). Before these sutures are fastened, the flap must be dealt with: the manner of doing so will depend on the nature of the case. If the posterior wall is not very lax or redundant, the whole of the flap may be preserved, and it is treated in the following fashion: it is doubled up on itself laterally by means of a continuous suture of fine

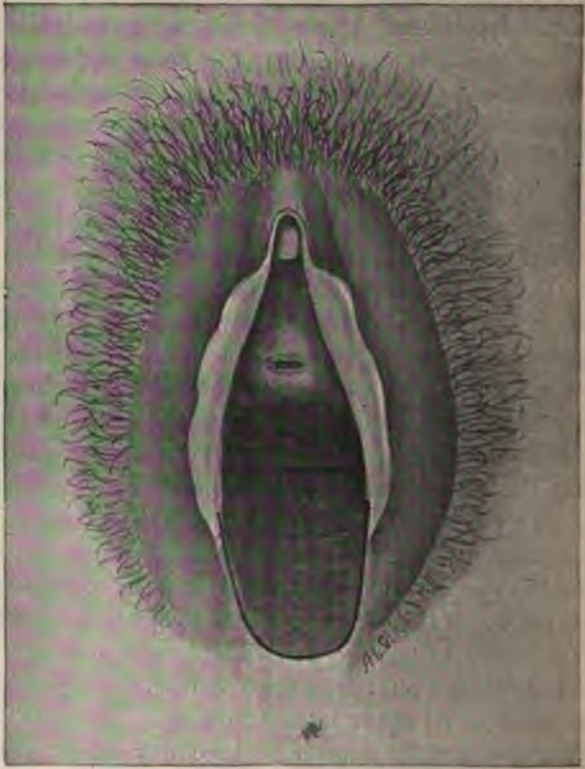


FIG. 122.—PERINEORRHAPHY FOR PARTIAL LACERATION, SHOWING THE LINE OF INCISION.

silk, which starts at the apex of the flap and passes from side to side, bringing the edges gradually together, as in Fig. 125, until the two sides of the base of the flap have been approximated. This suture is made off, and the deep lateral sutures are then fastened, either by tying or by means of shot and coil. This completes the operation. The method of dealing with the flap just described is an important point in the operation,

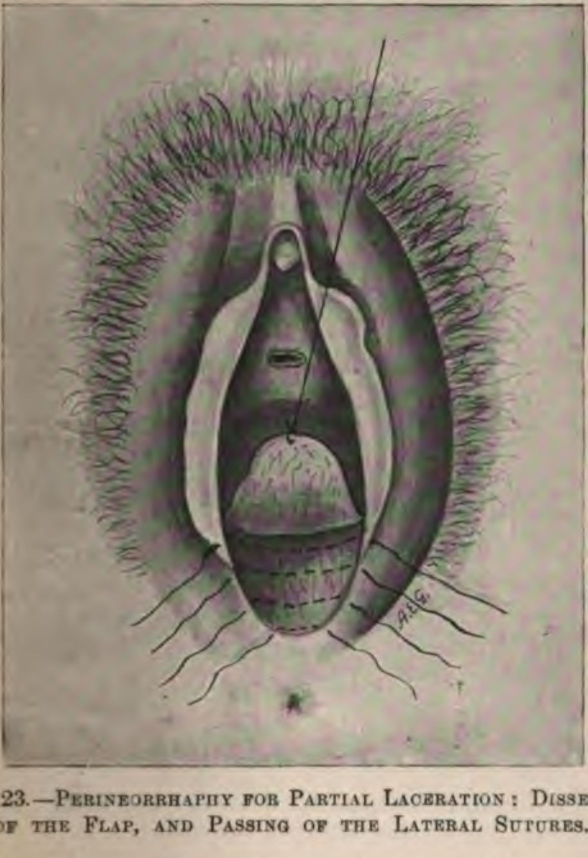


FIG. 123.—PERINEORRHAPHY FOR PARTIAL LACERATION: DISSECTION OF THE FLAP, AND PASSING OF THE LATERAL SUTURES.

for it shuts off any entrance of discharges into the wound from the vagina. The thickened spur of vaginal wall which results helps to strengthen the perineum as with a buttress.

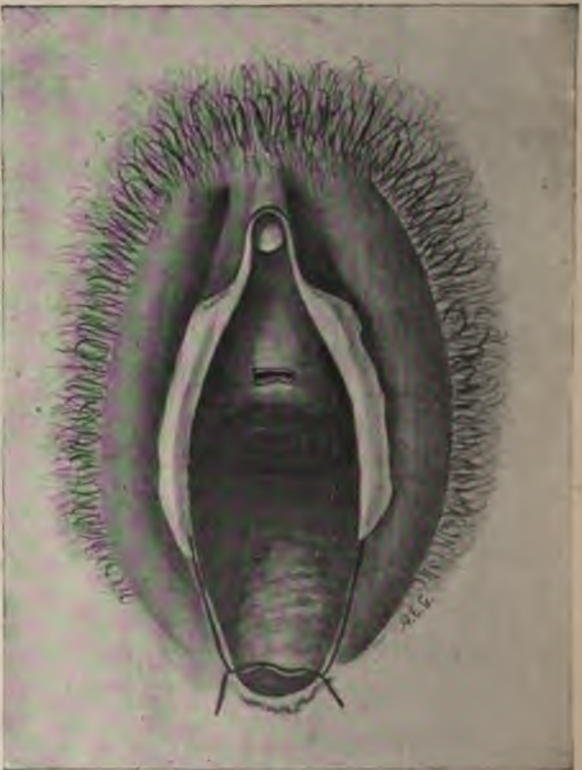


FIG. 124.—PERINEORRHAPHY FOR COMPLETE LACERATION, SHOWING THE LINES OF INCISION.

When the posterior vaginal wall is lax and redundant, as in the condition known as rectocele, it is best to remove a portion. The simplest plan is to cut off the flap, and close the vagina with a continuous suture, as before; but, instead of starting at the apex of the flap, the suture is introduced in the middle of the raw edge which is left after cutting the flap away; and the lateral parts of this edge are then gradually approximated, so that their union forms a vertical seam running down the middle of the posterior vaginal wall.

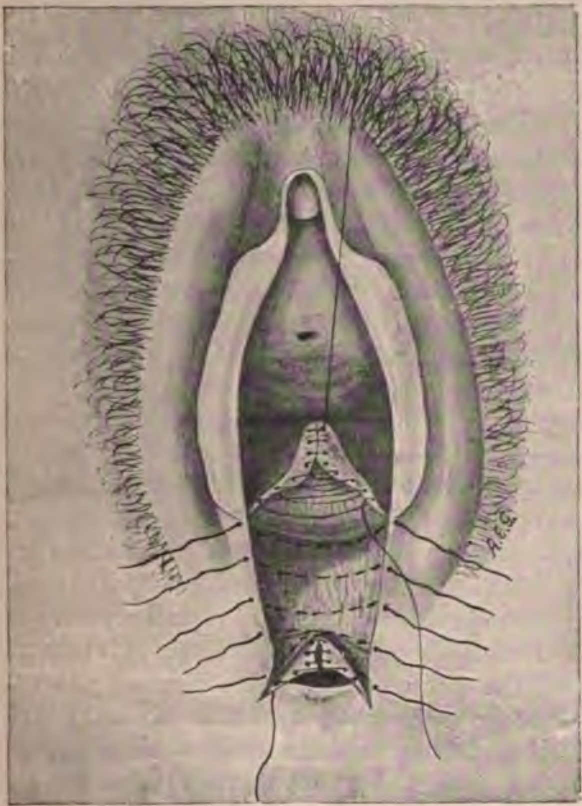


FIG. 125.—PERINEORRHAPHY FOR COMPLETE LACERATION, SHOWING THE METHOD OF SUTURING THE FLAPS TO FORM POSTERIOR VAGINAL AND ANTERIOR RECTAL WALL.

As regards dressing, the vagina is lightly packed with iodoform gauze, and a pad of sterilized absorbent wool is kept in position against the perineum by means of a T-bandage.

Complete Perineorrhaphy.—This operation, which is an extension of the preceding one, has three objects: (1) to provide a posterior wall for the vagina; (2) to form an anterior wall for the rectum; (3) to form a new perineum between the two structures. The first object is attained by raising a flap towards the vagina as above described. The second object is effected by raising two small lateral flaps backward and inward towards the rectum. The lateral sutures fulfil the third object.

The incision is shown in Fig. 124. The point of the scissors is introduced in the middle line at the edge of the recto-vaginal septum, which is put on the stretch by two fingers introduced into the rectum. The incision is carried along the edge of the septum, then forward along the junction of skin and vaginal mucous membrane to the posterior end of the labium minus. A corresponding incision is made on the opposite side. An incision is then carried backward on each side for about ½ inch, starting at the junction of the recto-vaginal septum with the skin, as shown in Fig. 124. The total incision is thus roughly H-shaped, the anterior limbs of the H passing forward on each side of the vagina, the posterior limbs passing backward on each side of the anus, and the crossbar corresponding to the recto-vaginal septum. The anterior flap is dissected forward as previously described (Fig. 123). Two triangular lateral flaps are then dissected up posteriorly, as shown in Fig. 125, the apex of each corresponding to the angle between the crossbar and the posterior limb of the H incision. When turned backward and inward these two flaps meet, and they are fastened together by a continuous suture of fine silk, which starts from the junction of the two flaps, and passes from side to side, gradually approximating first the median and then the posterior edges of the flaps. At the stage shown in Fig. 125 the wound is shaped roughly like a four-sided pyramid with its base superficial. The anterior border of this base is formed by the anterior flap, the posterior border by the joined posterior flaps, the sides of the base are formed by the skin edges. In the completed operation the sides of the pyramid are brought together, whilst the anterior and posterior borders become doubled up on themselves, forming ridges respectively on the posterior vaginal and the anterior rectal walls.

After the posterior flaps have been fashioned, but before they are brought together, the deep sutures are passed from one skin margin to the other and left unfastened. The posterior flaps are then sutured in the manner described above; the anterior flap is sutured as shown in Fig. 123; and, lastly, the deep sutures are fastened. The dressing is as before.

After-treatment.—In a certain proportion of cases the patient has some difficulty in passing urine during the first day or two, and the catheter may be required. The bowels should be open early when the laceration is partial; when it involves the rectum it is well to keep the bowels at rest for two or three days. The wound should be kept as dry as possible, and this remark applies to its vaginal as well as to its perineal portion. For this purpose the pad of absorbent wool should be renewed frequently, and fresh iodoform gauze should be introduced into the vagina from time to time. The sutures are removed from the eighth to the tenth day. It is wise to keep the patient absolutely resting for a fortnight, especially after complete perineorrhaphy.

Removal of Urethral Caruncle.—This troublesome condition admits of two methods of treatment: (1) Excision; (2) destruction by the cautery.

Whichever method be employed, it is wiser to have the patient anæsthetized. No doubt many cases have been successfully treated under the use of local anæsthetics, but for the satisfactory relief of this condition it is, before all things, necessary that, whatsoever method be employed, the removal should be thorough.

Instruments required in addition to the list on p. 432: Iris forceps and scissors, needles and sutures, glass catheter, dilators, a Paquelin or an electric cautery.

1. *Excision.*—The patient is anæsthetized and secured in the lithotomy position. The urethral orifice is well exposed in a good light and the bladder emptied by means of a catheter. The bill of the speculum is then introduced into the vagina, and the urethra dilated with the uterine dilators up to No. 6. The caruncle is then carefully dissected from the muscular layer of the floor of the urethra, and followed up the canal until its limits are reached, and snipped off. Useful instruments for this purpose are the delicate forceps and scissors employed for operations on the iris. After the caruncle is snipped off there is generally free bleeding; this is easily controlled by passing two thin silk sutures through the cut edge of the urethral mucous membrane and the free margin of the urethral orifice. When the sutures are tied the bleeding ceases.

After-treatment.—Some patients are able to micturate unaided within a few hours after the operation; in others retention lasts for several days, necessitating the careful use of the catheter thrice each twenty-four hours or oftener. In this event the nurse observes scrupulous cleanliness, always removing the mucus and pus which may have accumulated around the urethral orifice before introducing the catheter. The best method of keeping the catheter clean is to boil it. The patients require to keep their bed for about seven days.

2. *Destruction by the Cautery.*—This is the simplest method: the patient, duly anæsthetized, is arranged as for excision.

The vulvar structures are then carefully protected by retractors or the fingers of an assistant, and the caruncle is thoroughly destroyed with the narrow point of the cautery at a red heat. Vaseline is then applied to the cauterized surface. The cautery answers very well for small caruncles.

The *after-treatment* is the same as that described after excision.

Removal of the Clitoris.—This operation is necessary in two conditions: (1) Cancer; (2) elephantiasis.

Instruments required in addition to the usual set (p. 444): Scalpel, hæmostatic forceps, Paquelin's cautery, dissecting forceps.

The Steps of the Operation.—The patient is anæsthetized and arranged in the lithotomy position, the skin freely incised so as to include the diseased area. The crura of the clitoris are then exposed, and detached from the pubic arch by means of a raspatory or the handle of a scalpel. The bleeding is always free, but the surgeon aims to secure with forceps the dorsal arteries of the clitoris as soon as they are divided. Should there be much oozing after the larger vessels have been secured, the application of a cotton-wool compress wrung out of very hot water will control it.

Occasionally the diseased parts may be removed with the scalpel, and leave sufficient loose skin to enable the edges to be brought into apposition by means of sutures. This is very desirable, as it controls the oozing and should be followed by immediate union. When the diseased surface is destroyed by the cautery, or the surrounding tissues are so involved that a wide removal of skin as well as clitoris is necessary, then the denuded area is left to repair by granulation and cicatrization.

Tumours of the Labia.—No definite plan can be described to meet the needs of every species of tumour occurring in this region, but the principles involved are those which apply in other regions of the body. It is advisable to have the hair removed from the part, the field of operation washed thoroughly with warm soap and water, and a compress wrung out of an antiseptic solution applied for twelve hours before the time fixed for the operation. As the labia are very vascular, operations on them are attended with free bleeding. It is always a great advantage to bring the skin edges together, even when it is necessary to sacrifice this tissue freely, as in the case of cancer or melanoma. In applying dressings to operation wounds in this region it is essential to arrange them in such a way that they need not be disturbed during micturition or be soiled during the act.

Cyst of Bartholin's Gland.—The incision should be vertical; when it is possible the cyst should be removed without being punctured or incised, as this renders the operation easier, and in the case of abscess the tissues are not soiled with the pus. But it is often very difficult to avoid puncturing a suppurating cyst.

Hæmorrhage is generally moderately free from the venous plexus round about; this is especially the case with suppurating cysts. In the deeper portions small branches of the internal pudic artery may be cut and require ligature. Oozing is best controlled by passing three or four deep sutures from one side to the other; each suture should enter and leave the skin 3 millimetres from the cut edge, and should pass under the cavity left by the removal of the cyst without penetrating into it. Even when this is done there is generally a little oozing for the first twenty-four hours, so that it is advisable to introduce a thin piece of sterilized gauze to serve as a drain for a few hours.

In addition to the deep sutures a few superficial ones may be used to keep the wound margins in accurate position.

A dressing of gauze is applied, and changed frequently to avoid urinary contamination. If there be much vaginal discharge a douche of boracic acid or perchloride of mercury solution (1 in 5,000) is advisable once or twice in the twenty-four hours.

Colporrhaphy (*Elytrorrhaphy*).—This term is applied to an operation (of which there are many modifications) for narrowing the vagina by dissecting away a portion of the mucous membrane, either from the rectal aspect (posterior colporrhaphy) or from the vesical aspect of the vagina (anterior colporrhaphy). The operation is mainly employed for the relief of severe prolapse of the uterus, cystocele, and rectocele.

Posterior Colporrhaphy.—The patient is secured in the lithotomy position, and the vagina thoroughly exposed with retractors. An elliptical incision, one end of the major axis being close to the cervix, the other near the vulvar orifice, is made in the mucous membrane of the posterior vaginal wall, taking care not to cut deeper than the recto-vaginal septum, lest the bowel be opened. The vaginal mucous membrane is then cautiously dissected off; the amount to be removed is estimated by the laxity of the parts and the degree of narrowing which the operator regards as necessary to meet the needs of the case. After removing the vaginal wall and securing the bleeding vessels the cut edges of the mucous membrane are brought into apposition by a continuous silk suture or interrupted sutures of silkworm-gut, or such other material as the operator thinks well to employ.

The patient is kept in bed for at least two weeks; her bowels are regulated, and the bladder should not be allowed to become overdistended. The sutures should be removed in about ten days.

Anterior Colporrhaphy.—This is a similar procedure carried out on the anterior vaginal wall. The bladder is very liable to be injured in dissecting off the mucous membrane, and is particularly liable to be punctured when the sutures are introduced.

A variety of incisions have been advocated. One method is to remove a circular area of the mucosa of the anterior vaginal wall, and bring the edges together by means of a purse-string suture. The plan that we prefer is as follows: The cervix being drawn down as far as possible with a volsella, a transverse incision 2 to 3 inches long is made across the base of the cervix, where it joins the anterior vaginal wall. A vertical incision is carried from the middle of the previous incision down the middle of the anterior vaginal wall towards the urethral orifice. Two triangular flaps are now dissected up, proceeding from the middle line outwards, and then cut off along the line of their attachment. This leaves a triangular raw surface, of which the base lies in front of the cervix and the apex is near the urethral orifice. A suture is now passed through the apex of the **V**, and through the middle of the base line below the cervix. The tying of this suture shortens the anterior vaginal wall, and from this middle point two continuous sutures are carried out laterally, resulting in a transverse seam in front of the cervix.

Colpo-perineorrhaphy.—Posterior colporrhaphy is generally combined with perineorrhaphy. All that is necessary, in addition to the procedure described under the latter operation, is to remove with scissors a wedge-shaped piece of the vaginal flap, and then to bring the resulting cut edges together with fine sutures.

Operations for Vaginal Fistulæ.—The successful operative treatment of these conditions demands not only operative dexterity and perseverance on the part of the operator, but experience and judgment. A clean linear cut in the bladder or ureter heals spontaneously, but fistulæ which need the assistance of the surgeon are always the result of sloughing and loss of tissue.

Preparation of the Patient.—This consists in thorough irrigation of the vagina and complete evacuation of the bowels.

The excoriation of the vulva and the adjacent parts of the thighs heals quickly enough when the leakage of urine is arrested.

Instruments required: The crutch, duckbill speculum, vesico-vaginal fistula knives, thin needles in handles, fishing gut, dissecting forceps, scissors.

Vesico-vaginal Fistula.—In the majority of cases the lithotomy position is the most convenient, but special conditions may demand a different position.

The principles underlying the treatment of all fistulæ of mucous canals apply here, namely: (1) The vivifying of the edges of the fistula; (2) the careful suturing of the edges; (3) immediate union.

Paring the Edges of the Fistula.—This is effected in the following manner. Access to the vagina is obtained by means of an Auvard's or a duckbill speculum. The margins of the fistula are then freely pared by means of a sharp delicate knife mounted on a long handle. These knives are usually supplied in sets of three or four, with the blades adjusted at different angles to meet any difficulty according to the position of the fistula. The vaginal edges of the fistula should be removed by two slightly curved incisions meeting above and below, and the vaginal tissue is removed by superficial dissection which does not reach the bladder wall. A lens-shaped raw surface is left, which has its long axis vertical. The bladder edges of the fistula are similarly removed, but with the long axis of the resulting denudation horizontal. The edges of the bladder incision are now brought together with fine catgut, so as to make a *transverse* seam in the bladder; and the operation is completed by bringing together the vaginal cut edges, producing a *vertical* seam in the vaginal wall. Thus the wounds in the bladder and vagina cross each other at right angles, and touch only at one point, and the chances of complete union are in this way greatly augmented.

Application of Sutures.—The sutures may consist of silk thread or silkworm-gut. Whatever material is used it should be introduced with a slender needle, and should traverse the muscular but not the mucous coat of the bladder or urethra. This stage affords much scope for ingenuity on the part of the operator.

After the sutures are fastened it is wise to test the wound to ascertain if it be watertight. For this purpose milk is injected into the bladder. Should any escape through the wound an additional suture is inserted at the situation of the leak. If all be secure the bladder and vagina are gently irrigated with warm water and the patient returned to bed.

After-treatment.—It is advisable as soon as the patient recovers consciousness to allow her to lie on her side or even in the prone position.

Some operators prefer to keep a catheter in the bladder for several days, others of equal experience reject this method and enjoin the regular careful use of the catheter. It is important to keep the bowels regular.

Removal of Sutures.—These may be withdrawn about the eighth or tenth day, and this is best effected under an anæsthetic.

When the fistula is small its complete closure may be effected by a single operation, but in many cases—especially when the hole is large—a small fistula will remain, and require a second and even repeated operations for its complete occlusion.

It is wise to allow a good interval to elapse before performing a second operation, to permit the wound to contract and the patient to benefit by change of air and scene after the confinement to bed. The misery these patients suffer makes them importunate in regard to operation.

The most difficult fistulæ to close are those situated near the vesical orifice of the urethra and those near to, or actually involving, the ureteric orifice.

Uretero-vaginal Fistulæ.—These often spontaneously close; failing this, attempts should be made to close them by a plastic operation on the principles employed for the occlusion of a vesico-vaginal fistula. In some cases surgeons have removed the kidney in order to relieve women of their almost insufferable distress.

Utero-vesical Fistula.—This is very rare, and in order to deal with it the surgeon will find it necessary to separate the bladder from the neck of the uterus, as described in the first steps in the operation of vaginal hysterectomy, in order to expose the vesical portion of the fistula.

Recto-vaginal Fistula.—This is a fæcal fistula, and when it complicates grave diseases of the rectum or vagina, such as cancer, sarcoma, or syphilitic lesions, operations are not admissible.

When the fistula follows an injury and persists it is treated on the same lines as a vesico-vaginal fistula. The operation may be conducted from the rectum when the fistula is accessible, but most operators prefer to carry out the treatment through the vagina.

Colpocleisis.—This term signifies an operation for the closure of the vagina. It has been practised for the relief of incurable forms of vesico-vaginal fistulæ.

The principle of the operation consists in vivifying the whole circumference of the vagina below the fistula, and then bringing the pared edges into close apposition by means of silkworm-gut sutures on the same principle as that employed for closing vesico-vaginal fistulæ.

CHAPTER LII

OPERATIONS ON THE UTERUS

DILATATION OF THE CERVICAL CANAL OF THE UTERUS; CURETTING; VAGINAL MYOMECTOMY.

Dilatation.—It may be necessary to dilate the cervical canal for the following conditions: (1) To remove retained products of conception; (2) curettage; (3) for dysmenorrhœa; (4) removal of a polypus; (5) diagnostic purposes in suspected cases of polypus or cancer of the body of the uterus.

In addition to the usual gynæcological instruments (see p. 444) it is necessary to be furnished with dilators and a curette (scraper).

Uterine Dilators.—There are many varieties of dilators; the set we find most useful was designed by Dr. W. H. Fenton. It comprises ten dilators; each consists of a curved metal rod made of copper and electroplated with silver. The advantage of using metal dilators is that they can be immersed in the sterilizer. Each dilator is 30 centimetres (12 inches) in length, but differs in thickness at each end, so that after introducing the narrow end into the uterine cavity the operator reverses the instrument for the succeeding number. In using these instruments they need to be thoroughly lubricated. It is also well to have a distinctive mark so that the operator can easily distinguish the smaller from the larger end. There are many ways of doing this; in some sets the higher number is distinguished by a metal collar. These instruments are very useful for dilating the urethra when it is necessary to explore the interior of the bladder.

The Curette (or Scraper).—This term is applied to an instrument employed for scraping the cavity of the uterus or its cervical canal. There are several varieties of curettes—some are shaped like a spoon, with sharp edges, whilst others are ring-shaped, with thin edges. They are furnished with handles so that they may be effectively used. Some curettes are made hollow, and are connected with an irrigator by means of india-rubber tubing, so that a stream of sterilized water or an antiseptic solution issues from the instrument and flushes the uterine cavity whilst the scraping is in progress.

The principle of the curette is this—all soft processes and diseased tracts of mucous membrane or retained pieces of placenta and decidua are easily detached by it, whilst its edge is not sharp enough to damage the underlying muscular wall of the uterus when the implement is used with due care and gentleness.

The Steps of the Operation.—The patient is anæsthetized, and secured in the lithotomy position by means of the crutch. The vagina is douched with warm water, and the bill of the speculum introduced into the vulvar orifice. The anterior lip of the cervix is secured with a volsella so as to be under the control of the operator. The uterine sound is then introduced gently to furnish information as to the length and direction of the uterine cavity.

The dilators are then introduced in the following manner. They lie in their proper order in a vessel of warm water or weak antiseptic solution; from this they are taken up in turn and dipped in vaseline or a vessel containing glycerine and perchloride of mercury (1 in 2,000), or any suitable lubricant, and introduced into the cervical canal with the right hand, whilst the operator makes countertraction by firmly grasping the volsella, which is fixed to the cervix, with his left. The early numbers usually pass easily so long as they are well anointed and introduced in the axis of the uterine cavity.

The rapidity and degree of dilatation vary with the necessity of the case. Thus when the operation is undertaken to remove retained products of conception the softened cervical canal dilates very easily, and the dilatation is carried on until the canal is large enough to admit the index finger, and permit thorough exploration of the uterine cavity. (The finger will follow No. 16 or 18.)

For diagnostic purposes in cases of suspected polypus it is wise to dilate sufficiently to admit the finger; in this way exact information as to the seat, size, and condition of the tumour is obtained.

When needed for suspected disease (cancerous or otherwise) of the endometrium, dilatation to No. 10 or 12 is sufficient, as this allows the introduction of the curette and abstraction of fragments, and even complete curettage of the uterine cavity. For dysmenorrhœa the dilatation should be carried to No. 12. In many cases of uterine polypus occurring in single and sterile married women the cervical tissues do not easily yield to the dilator, and great care is necessary to avoid extensive laceration of the cervical tissues in the vicinity of the internal os.

It is sometimes an advantage to secure the neck of the uterus with two volsellæ—one on the anterior and one on the posterior lip.

There are two opposite conditions to be borne in mind when using dilators. A soft and yielding cervix, as in patients who have recently aborted or who have a cancerous uterus, readily admits the instruments, but is easily perforated by the sound or thin dilators. A firm, unyielding cervix easily lacerates, and the exercise of undue force during the introduction will cause the instrument to perforate the uterine wall or tear the lower part of the cervix from the upper in a circular direction. Unless the direction of the uterine canal be carefully observed, a false passage is apt to be made, burrowing into the uterine tissue or into the mesometrium. The risk of this accident is greatest in the early stages of dilatation, when the smaller instruments are being used.

After the canal has been dilated to the requisite size, and the operator has met the necessities of the case by abstraction of fragments of placenta or a polypus, etc., he thoroughly douches the cavity with hot water, then dries it with pledgets of cotton-wool on a uterine probe, and applies iodized phenol, iodine, or any application he deems necessary to the endometrium. In cases where the oozing is free the cavity may be plugged with sterilized gauze, or gauze impregnated with iodoform, aristol, or other drugs in fashion. The vagina is tamponed, the surrounding parts are dried, and the patient returned to bed.

After-treatment.—This is very simple. In twenty-four hours all tampons and plugs are withdrawn, and a warm vaginal douche administered twice daily.

In the simplest case it is wise to keep the patient confined to her bed ten days, in other cases no rule can be laid down; it must be decided by individual experience.

Dangers.—Dilatation of the cervical canal is the simplest of all gynæcological operations, and if conducted with scrupulous care and cleanliness should have but one risk—namely, that of the anæsthetic. It is, however, occasionally a source of grave danger and death. Fatal results have been due to the following causes: (1) Perforation of the uterus with the sound, curette, or dilator; (2) Septic endometritis spreading into the Fallopian tubes; (3) pelvic cellulitis secondary to laceration of the cervix; (4) rupture of purulent collections in the Fallopian tubes (pyosalpinx) or ovaries (ovarian abscess).

Should dilatation be incautiously advised and the uterus be gravid, abortion would be the almost inevitable consequence.

Vaginal Myomectomy.—Under this heading will be described the various operations for the removal of fibroids from the cervical canal and cavity of the uterus.

Instruments required in addition to those enumerated on p. 444: Scissors, scalpel, bull-dog volsella, and hæmostatic forceps.

Steps of the Operation.—These vary considerably according to the size, character, and position of the tumours. It will be convenient to describe the simplest condition, and then proceed gradually to those that may offer very great difficulty.

The patient is secured in the lithotomy position by means of the crutch; the vagina is thoroughly douched, and the cervix exposed by a duckbill speculum.

A Pedunculated Fibroid (Polypus) protruding from the Cervix.—In such a case the operator carefully examines the polypus with a view of ascertaining, if possible, the point where the pedicle is connected with the uterus; he should also satisfy himself that the uterus is not partially inverted (see p. 169). When the pedicle is very narrow it can easily be severed by twisting it on its longitudinal axis. When it is thicker the pedicle is snipped through with a stout pair of scissors, and the tumour detached; then the forefinger is introduced to be certain that there are no other polypi. The parts are then thoroughly irrigated and dried with cotton-wool on the uterine probe; tampons impregnated with a mild antiseptic reagent (liquid or powder) are inserted into the vagina, and the patient returned to bed.

After-treatment.—The tampons are removed in twelve hours and the vagina douched twice daily. If there has been much bleeding prior to operation, and this has produced marked anæmia, some mild preparation of iron may be prescribed. Convalescence at the end of two weeks is the rule.

A Sessile Fibroid protrudes at the Cervix.—When such a tumour does not exceed the size of a bantam's egg it may be dealt with in the following way :

The cervical canal is dilated until it easily admits the finger ; this enables the operator to determine the size and position of the tumour. With a scalpel he divides the mucous membrane overlying the tumour, and with his finger or a raspatory shells the tumour out of its capsule up to its base. With a stout bull-dog volsella the tumour is seized close up to its base, inside the capsule, and then he gently and cautiously rotates the volsella, and at the same time drags upon it ; this twists the fibroid, and after two or three complete turns it is dragged out of its bed.

The uterus is flushed with water at 115° F., then carefully dried with cotton-wool on forceps. When there is free oozing the cavity is plugged with antiseptic or sterilized gauze.

The chief danger in this operation is seizing the tissue of the uterine wall instead of the tumour. Free bleeding and even fatal peritonitis may follow a tear through the wall of the uterus.

When the fibroid is septic the cavity of the uterus should be thoroughly curetted and disinfected.

Sessile and Pedunculated Uterine Fibroids with an Undilated Cervical Canal.—When the symptoms indicate the probable presence of a submucous fibroid the operator dilates the cervical canal and explores the uterine cavity with his finger. On detecting a tumour he then determines its size, seat, and character. When it is small he proceeds according to the instructions detailed in the two preceding sections.

It occasionally happens that he finds himself face to face with one or other of these conditions : (1) A large pedunculated fibroid ; (2) a large sessile fibroid with a broad base.

In the first example it is easy to detach the tumour from its pedicle by rotation, but the difficulty will be met with in its "delivery." In the second example there will be difficulty in detaching as well as in extracting the fibroid.

This brings us to the consideration of the important question: How large a tumour may be safely and expeditiously delivered by vaginal myomectomy?

We will relate our own practice in this matter. With a yielding cervix the cervical canal can be readily and without risk dilated up to No. 20 (a diameter of 25 millimetres), and this will allow of the extraction of the fibroid of the size of a bantam's egg. Submucous fibroids are often ovoid. When the tumour exceeds these dimensions its detachment and delivery may be facilitated by free bilateral division of the cervix up to the vaginal reflection; should the bleeding be free the uterine artery may be secured at the end of each incision by means of a silk ligature and an aneurism needle. Fibroids with a diameter of 5 centimetres may be detached and extracted in this manner. The divided surfaces of the cervix are easily brought into apposition and secured with silkworm-gut sutures.

When a fibroid equals in size a fœtal head it is possible to remove it through the vagina by the method known as "*morcellement*." The cervical canal is dilated, and then the cervix is split on each side with scissors; the uterine arteries are then secured with ligatures. The division of the cervix gives free access to the uterine cavity. Sometimes it is more useful to turn the bladder off the cervix, as in the first stages of vaginal hysterectomy, and then split the anterior wall of the cervix in the middle line as high as the peritoneal reflection. As a rule bleeding is very slight; if it should prove troublesome the uterine arteries may be ligatured.

The next step of the operation consists in freely incising the capsule of the tumour, then, after enucleating it to its base, the operator proceeds to remove it piecemeal by means of scissors and stout volsellæ.

Myomectomy by *morcellement* is greatly in favour in Germany and France. In this country it is not widely practised. The custom of the leading gynæcologists in this country is to limit vaginal myomectomy to tumours not exceeding a diameter of 5 or 6 centimetres—roughly the dimensions of the patient's fist. When a fibroid exceeds these dimensions, and in many cases when it is even smaller, a much more satisfactory operation is that of abdominal hysterotomy, which will be described later; or it may be advisable to perform an abdominal hysterectomy.

The **dangers** of vaginal myomectomy are bleeding, perforation of the uterus, inversion of the uterus, and septicæmia.

CHAPTER LIII

OPERATIONS ON THE UTERUS—(*Continued*)

TRACHELORRHAPHY; AMPUTATION OF THE CERVIX.

Trachelorrhaphy.—This name is applied to an operation for the repair of lacerations of the cervix uteri.

Instruments required in addition to those enumerated on p. 444: Volsella, reversible tenacula, scalpel, dissecting forceps, sutures, shot and coils, shot compressor, and needles in handles.

Steps of the Operation.—The patient is anæsthetized and placed in the lithotomy position, and the cervix well exposed by means of Auvard's speculum. The vagina is thoroughly disinfected by douching and swabbing, and dilatation and curetting are then carried out when necessary. After this the anterior lip of the cervix is seized with a volsella, and the reversible tenacula forceps introduced exactly in the middle line, and the points separated as in Fig. 126. By this means the two lips of the cervix are held widely apart. The volsella is then removed. By means of scalpel and forceps two flaps are now dissected off the exposed surface, taking care to leave a narrow strip of mucous membrane in the middle line, which will form the lining for the new cervical canal when the lips are approximated. In Fig. 126 the line of incision is shown on the right side of the cervix, whilst on the left side the flap is shown partly dissected. While the surfaces are being vivified there is usually free oozing ; this is useful as it serves to deplete the cervix and diminish its volume. In many cases before operation the bulky everted lips look as if they could not come together, yet after the depletion brought about by the dissection they can be approximated with ease.

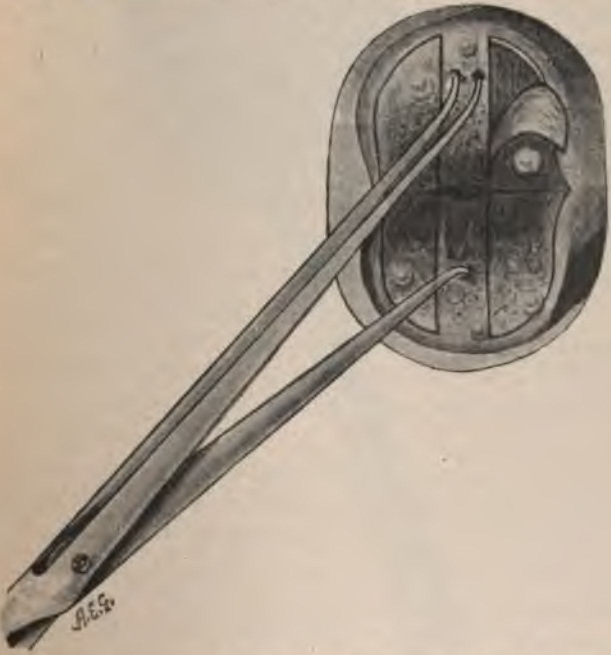


FIG. 126.—TRACHELORRHAPHY, FIRST STAGE, DISSECTION OF THE FLAPS.

When the flaps have been dissected off the tenacula forceps are removed, the lips of the cervix are allowed to fall together, and the forceps are then reapplied in such a way as to hold them in apposition, as in Fig. 127. Care must again be taken to secure the cervix in the middle line. The instrument enables the operator to manipulate the cervix during the introduction

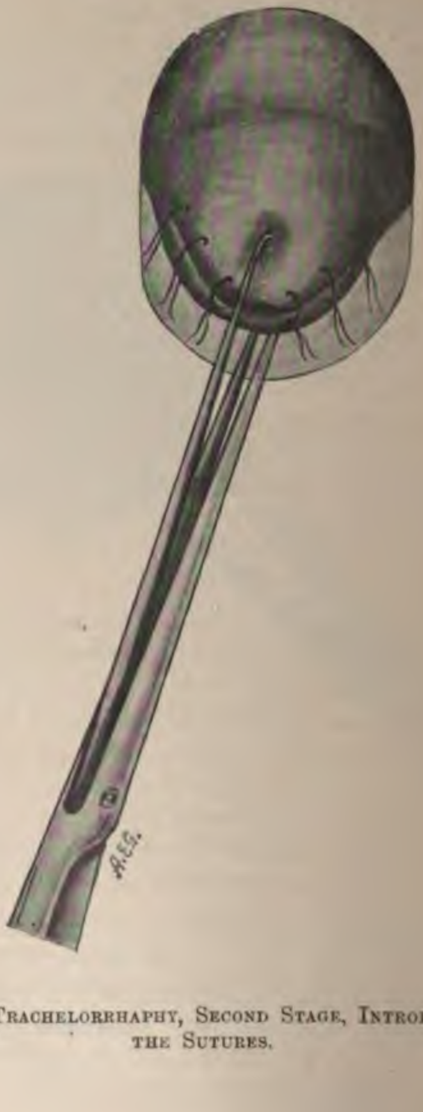


FIG. 127.—TRACHELORRHAPHY, SECOND STAGE, INTRODUCTION OF THE SUTURES.

of the sutures. For this purpose a curved needle set laterally in a handle is very convenient, or small stout curved needles may be used with a needle-holder. The best material for the sutures is silkworm-gut, and if secured by means of the shot and coil their subsequent removal is greatly facilitated. For the sake of those who are not familiar with the shot and coil, we may explain that the coil is a tight and narrow spiral of silver wire about 2 centimetres long; the two ends of the suture are threaded through the spiral and then through the shot, which is perforated for the purpose. The shot is lightly seized with a compressor and pushed along till the coil lies up against the cervix; when in position firm compression of the shot will hold it and the coil in place. Three or four sutures should be introduced on each side, and those nearest the middle line should be about 1 centimetre apart. The tenacula forceps are now removed, and a sound is passed into the uterus to make sure that the cervical canal is free. The parts are then carefully dried, and the vagina lightly packed with iodoform gauze.

After-treatment.—The gauze is removed on the day following, and the vagina is douched with sterilized water twice daily for the first week, and once a day afterwards. The sutures may be removed on the tenth day. For this purpose long scissors and forceps are necessary when the sutures have been tied, the cervix being exposed by means of a speculum. When shot and coil sutures have been used a speculum is not necessary, as the shot is cut off with scissors, guided by the fingers, the coil slipped off, and the suture drawn out with fingers or forceps. The patient is allowed to get up on the tenth day.

Amputation of the Cervix Uteri.—This operation is performed for cancer and elongation of the neck of the uterus.

The methods of performing this operation have been greatly modified and simplified; it will therefore be advantageous to depart from the usual custom of describing every modification that has been introduced, and give an account of the principles of the operation. It is necessary to point out that vaginal hysterectomy is so rapidly coming into favour that amputation of the cervix will, in the majority of cases of carcinoma of the cervix, be superseded by this more thorough operation.

Instruments required in addition to the list on p. 444: Retractors, catheter, needles in handles, hæmostatic forceps, dissecting forceps, and sterilized silk ligatures.

Steps of the Operation.—The cervix is thoroughly exposed by the introduction of the bill of a large speculum; with the sound the operator determines the position of the cervical canal, and estimates the mobility of the uterus; by means of the vesical sound the precise relation of the bladder to the cervix is ascertained. The cervix is firmly grasped with a stout volsella and drawn down; with a scalpel the surgeon transversely divides the mucous membrane on the anterior wall of the cervix as high above the cancer as the bladder permits; the assistant keeps him informed of the position of the bladder by retaining the sound in the lowest part of the vesical cavity. Having divided the mucous membrane, the bladder is easily detached from the cervix by the handle of the scalpel.

The knife is then carried through the mucous membrane on the sides and posterior aspect of the cervix. The next step is to secure the uterine arteries as they run on to the sides of the cervix near the spot where the vaginal mucous membrane is reflected on to it. When the bladder is detached and held apart from the cervix by a retractor, whilst the cervix is awn down by the volsella, the artery may be seen, and is y secured by a silk thread conveyed around it by an rism needle. It is well to secure it with two threads, and se to the cervix as possible, in order to avoid the ureter.

Having secured the artery on each side, the cervix may be amputated with a scalpel or with scissors. When the uterine arteries are deliberately exposed and secured there is no bleeding from the stump, but a small artery here and there in the cut edge of the vaginal mucous membrane may require to be seized with hæmostatic forceps or ligatured. The vagina is then douched, dried, and tamponed, and the patient returned to bed.

The after-treatment is simple. The tampons are removed in twenty-four hours, and the vagina douched twice daily. The catheter is used every eight hours unless the patient can void her urine unaided—this is always an advantage. Convalescence is usually rapid.

Dangers.—In judiciously selected cases the operation is one of the safest in surgery. The pitfalls are these: the bladder may be injured in the process of separating it from the cervix. If the arteries are tied at a distance from the uterus the ureters are apt to be included in the ligature. When the posterior incision is carried too far back the rectum may be damaged and cause a temporary fistula. If the peritoneum is accidentally incised and the recto-vaginal fossa opened, then the incision should be closed. Pelvic cellulitis and peritonitis may arise if aseptic precautions are not rigidly carried out. Hæmorrhage may occur from slipping of an ill-applied ligature.

When amputation of the cervix is undertaken on account of elongation of the supravaginal portion the steps of the operation are similar to those just described. When the elongation affects the vaginal portion the procedure is considerably simpler because the bladder does not require dissecting off, and the uterine arteries are not interfered with. The operation is then as follows:

The cervix is first split up bilaterally as far as may be required. A transverse incision is then carried across the anterior lip from the vaginal aspect, the blade of the knife travelling obliquely upwards and backwards through half the thickness of the lip. A similar incision is made on the posterior surface of the anterior lip, the knife passing upwards and forwards to meet the deepest part of the first incision. In this way the portion of the lip removed is cut out in the form of a wedge. The posterior lip is treated in a similar fashion, and the sutures are then introduced in the following manner—one or two sutures are passed through the anterior lip near the middle line in such a way as to bring together the mucous membrane of the cervical canal and that covering the cervix anteriorly. The same thing is done in the case of the posterior lip, and thus the boundaries of the new cervical canal are formed. Two or three sutures are then put in on each side, passing through both anterior and posterior lip, and these complete the operation. The vagina is douched and packed with gauze, which is left in for eighteen to twenty-four hours. The sutures may be removed on the tenth day.

CHAPTER LIV

OPERATIONS ON THE UTERUS—(*Continued*)

VAGINAL HYSTERECTOMY.

Vaginal Hysterectomy signifies the removal of the uterus (and sometimes the ovaries and Fallopian tubes with it) through the vagina. It is mainly performed for cancer of the cervical canal and cancer of the body of the uterus, but it may be necessary to remove the uterus by this route in such conditions as sarcoma of the uterus, uterine fibroids, fibrosis of the uterus giving rise to uncontrollable metrorrhagia, and intractable procidentia.

The instruments required are the same as those employed for amputation of the cervix.

The Steps of the Operation.—The patient is anæsthetized and secured in the lithotomy position by the crutch, and arranged so that the perineum faces a good light. The hair is shaved from the pubes and labia (it is an advantage to have this carried out by the nurse some hours previously, but it is not always agreeable to the patient), and the external parts washed with warm soap and water, and then douched with a solution of perchloride of mercury (1 in 2,000) or some equally efficacious antiseptic.

The operator, seated at a convenient level, introduces the beak of the speculum into the vagina, and passes a sound into the bladder; this the assistant retains there in order to keep the operator informed of the relation of the bladder to the cervix throughout the first stage of the operation.

Stage 1.—The cervix is seized with a stout volsella, and then by means of a scalpel the mucous membrane on its anterior aspect is transversely divided at a point sufficiently low to avoid injury to the bladder. The bladder is then cautiously separated from the cervix with the forefinger, assisted, if necessary, with the handle of the scalpel. On reaching the level of the os internum the bladder and uterus are connected only by the fold of peritoneum forming the lower limit of the utero-vesical pouch. This is divided transversely, giving access to the peritoneal cavity. Throughout this stage the operator constantly informs himself of the exact position of the bladder by manipulating the sound.

Stage 2.—The incision in the mucous membrane is now carried round each side of the uterus, and by means of scissors the recto-vaginal pouch is opened.

Stage 3.—The broad ligaments are dealt with in the following manner: a curved needle in handle armed with strong silk is made to transfix the connective-tissue tract close by the side of the cervix in order to avoid the ureter. The object of this ligature is to secure the uterine artery near the spot where it turns on to the side of the uterus. The ligature is firmly knotted. Very often the artery may be seen. It is then picked up with forceps and deliberately tied. When the artery has been secured on each side, and the tissue between the ligature and the uterus divided with scissors, the organ can, as a rule, be drawn low down into the vagina, and the upper segments of the broad ligament transfixed with double silk ligatures. These are tied above and below so as to embrace the Fallopian tubes with the ligament of the ovary, the ovarian artery and veins, and the round ligament of the uterus; the tissues between the uterus and the ligatures are divided, and the uterus is removed. Should the ovaries or

Fallopian tubes be found diseased, then they should be removed by transfixing the pedicle with silk.

If the silk threads have been properly secured there is, as a rule, no bleeding; should any free oozing be noticed the bleeding-point is sought, seized with hæmostatic forceps, and ligatured with thin silk. The vagina is then irrigated with warm water, and if the cut edge of the vaginal mucous membrane bleeds—a frequent condition—it is useful to secure it with a continuous suture of thin silk, or arrest the bleeding with forceps, and leave them on for twelve hours.

The details given above are those which are easily carried out when the vagina is capacious, and the uterus but slightly enlarged and mobile. It is very different when the vagina is narrow and rigid, as in virgins, and especially when the uterus is large, and cannot be drawn down. In these circumstances very much depends on the experience and skill of the operator. Sometimes it is necessary to divide the perineum, and even to make incision in the lateral walls of the vagina. In some cases it is useful to secure the uterine arteries, and then split the uterus sagittally with scissors and remove it in halves, or adopt the method of *morcellement*, and excise it piece by piece.

Many operators do not employ ligatures, but prefer to secure the broad ligament on each side of the uterus with specially constructed clamps. The uterus is then cut away, and the clamps remain *in situ* for about forty-eight hours; they are then carefully removed.

Each method has its advocates, and there are advantages and disadvantages associated with both. The employment of clamps greatly shortens the time occupied in the operation, and avoids subsequent troublesome sequelæ due to separation and sloughing of ligatures.

Operative Dangers.—The chief of these are:

1. *Injury to Bladder.*—Should this viscus be cut the

opening should be allowed to remain without suture; it usually closes.

2. *Injury to Ureters.*—These ducts are sometimes damaged in reflecting the bladder from the cervix; they are also liable to be included in the ligatures applied to the broad ligaments, or to be actually cut. When one ureter is thus occluded the accident is scarcely suspected until a few days after the operation; then the ligature separates, and the urine begins to leak into the belly or trickles from the vagina. When this happens the operator may be a little perplexed as to whether he has to deal with an injury to the bladder or a ureter, but a little watchfulness soon solves the problem. When the leakage is due to vesical fistula the whole of the urine escapes through the vagina, but when the leakage is due to a ureteral fistula half the total quantity escapes by the vagina, whilst the other half is voided in a regular manner by the bladder. In order to place the matter beyond doubt it is necessary to put the patient in the lithotomy position, and expose the vagina by a duckbill speculum in a good light, and inject a measured quantity of sterilized milk into the bladder; if this viscus be intact the milk will be retained, but if it be fistulous the milk will escape into the vagina. A systematic examination of this kind is of great advantage, inasmuch as it may enable the surgeon to determine which ureter has been injured, and as a ureteral fistula often demands the removal of the kidney for its cure, it is of the utmost importance to decide which ureter is at fault, as irreparable harm would be inflicted upon a patient by excising the kidney belonging to the intact ureter.

3. *Injury to Bowel.*—Occasionally the rectum has been cut in making the opening into the recto-vaginal fossa, and the small bowel has been nicked with the scissors in cutting through the broad ligaments. Should the small gut be adherent to the uterus it is apt to be torn. Such an injury will lead to the formation of a fæcal fistula, which is usually

temporary, but a source of inconvenience and great distress as long as it persists.

4. *Bleeding.*—However carefully the bleeding may be controlled, whether by ligature or clamp, a small quantity of reddish serum always finds its way down the gauze drain. Any serious loss of blood is due to the slipping of an ill-applied ligature or forceps, or a vessel which remained unsecured and then bled freely as the patient recovered from shock and anæsthesia. Free bleeding necessitates re-examination of the parts under an anæsthetic, and whilst preparations are being made to carry this out the loss of blood may be in a measure controlled by temporary digital pressure applied to the abdominal aorta. As soon as the source of the bleeding has been detected and secured, the patient should be transfused when the hæmorrhage has been severe (p. 489).

The After-treatment.—This is carried out on the same lines as those adopted after abdominal hysterectomy. The vagina needs to be considered; for instance, the gauze may be changed in thirty-six or forty-eight hours; when forceps are left *in situ* they require to be taken away with the following precautions—the patient's thighs are slightly raised and the knees gently separated, then a forceps is very carefully isolated from its fellows and the handles unlocked; after waiting a few moments, if there be no trickling of blood, the blades are detached by a gentle twisting movement. Should free bleeding occur in attempting to detach a forceps it is wise to relock it and leave it *in situ* for a further period of twenty-four hours. Oozing on the attempted removal of one forceps should not deter the surgeon in attempting to remove its companions. The temperature after vaginal hysterectomy usually rises towards the close of the second day; this is due to separation of ligatured or compressed and necrosed tissue. It may rise as high as 103° F., and the discharges become offensive. When this happens the vagina should be gently mopped out with small dabs of antiseptic gauze or cotton-wool. By the ninth day the ligatures begin to become detached, and as a rule they are all away by the twentieth day. Occasionally one or two remain in for several weeks. Generally the patient is allowed to leave her bed at the end of the second week.

Sequelæ.—Vaginal hysterectomy, like other surgical proceedings, is liable to be followed by evil consequences. Thus the operation may be rapidly fatal from shock and hæmorrhage. Death may follow in a few days from peritonitis (sepsis), and occasionally from injury to the ureters. With care, however, and with strict asepsis the operation has a very low rate of mortality (5 per cent.). The sequelæ are purulent discharge due to retained ligatures, vesical complications, especially cystitis, and occasionally thrombosis of the pelvic veins with œdema of the lower limbs and liability to embolism. In a few instances fatal intestinal obstruction has supervened on this operation, but patients seem less liable to this grave complication after vaginal than after abdominal hysterectomy or ovariotomy.

Colpotomy.—Experience acquired in the performance of vaginal hysterectomy has taught surgeons that the intraperitoneal relations of the uterus and its appendages may be explored, with reasonable safety, through an incision in the vaginal culs-de-sac.

When the incision is made posterior to the cervix it is called posterior colpotomy. When the operation is carried out anterior to the cervix, between it and the bladder, it is called anterior colpotomy.

Colpotomy is employed for the following conditions: for retroflexion of the uterus, small tumours of the ovary, for tubal pregnancy, for tubal disease, and for prolapse of the ovary.

Instruments required in addition to the list on p. 444:

Scalpels, hæmostatic forceps, dissecting forceps, needles in handles, silk, needles, volsellæ.

Anterior Colpotomy.—The patient is placed in the lithotomy position, and the bill of the speculum introduced into the vagina; the cervix is then drawn down with a volsella, and a sound is introduced into the bladder. The vaginal mucous membrane anterior to the cervix is incised transversely, taking care not to injure the bladder. (Some operators make this incision vertical.) With the handle of the scalpel the bladder is detached from the cervix as in the first steps of a vaginal hysterectomy. The peritoneum as it passes from the uterus to the bladder is divided, and the operator's fingers are now in the utero-vesical pouch. This enables him to ascertain accurately the position of the uterus and the coexistence or otherwise of ovarian enlargement or distension of the tubes.

When an ovary is prolapsed or obviously diseased it may be withdrawn through the incision, its pedicle ligatured, and the organ removed. This would be a vaginal oöphorectomy. Retroflexion of the uterus is dealt with thus: a sound is introduced into the uterus, which is then straightened and anteverted. A curved needle armed with a silk ligature is passed through the anterior aspect of the body of the uterus; the ends of the sutures are carried through the margins of the vaginal incision; when this ligature is fastened it maintains the uterus in position, and at the same time closes the vaginal incision. The adhesions which form in consequence of these proceedings are supposed to retain the uterus in its rectified position.

In some cases where the uterus is mobile in its flexed condition it is unnecessary to open the utero-vesical cul-de-sac. The fixation of the uterus thus becomes an extra-peritoneal proceeding, but then the operator is unable to ascertain the true condition of the ovaries and tubes.

The subsequent treatment is very simple—the bowels are carefully regulated, and the vagina douched twice daily with a weak solution of permanganate of potash.

The advantage claimed for this operation over abdominal hysteropexy (ventro-fixation) is that it is safer and avoids the chance of a yielding cicatrix. We do not recommend it.

Noble, in writing of the results of vaginal fixation of the uterus, states: "Over one-fourth of the pregnancies following this operation have ended in abortions, and the recent literature is burdened with reports of versions, artificial extractions, forceps operations, craniotomies, and Porro operations, so that I feel that, following its originators, we must consider it as condemned by its results, and as an unjustifiable operation in the case of women of child-bearing age" (1896).

Posterior Colpotomy.—This is an extremely simple proceeding. The field of operation is exposed as for anterior colpotomy, and the recto-vaginal fossa is reached through a transverse incision in the posterior cul-de-sac. The surgeon is then able to ascertain the condition of the uterus and the ovaries and tubes. Through such an incision he is able to break down adhesions which may fix the uterus, or remove a prolapsed ovary, or a small ovarian tumour, or a gravid tube in its very early stages.

In cases of pelvic abscess, and fluid effusions such as exist in posterior serous perimetritis, or extravasation of blood following intra-peritoneal rupture of a gravid tube, or tubal abortion, this method of exploring the recesses of the pelvis is simpler than an incision through the linea albæ.

Pelvic operations through the vagina are greatly facilitated by the use of Professor von Ott's method of electric illumination of the pelvis.

CHAPTER LV

GYNÆCOLOGICAL OPERATIONS—(*Continued*)

GROUP II.—ABDOMINAL.

In this group the following operative procedures will be described: (1) Cœliotomy; (2) ovariotomy; (3) enucleation of sessile pelvic cysts and tumours; (4) oöphorectomy; (5) hysterectomy; (6) hysteropexy; (7) Cæsarean section.

Cœliotomy.—When the surgeon opens the abdomen for the purpose of removing a tumour growing in a viscus the operation receives a specific name according to the organ concerned, such as ovariotomy, nephrectomy, splenectomy, and so forth. In very many cases the conditions preclude an exact diagnosis, and the operation of making an opening into the belly cavity is styled cœliotomy, but it may become a colectomy, or an oöphorectomy, etc. There are many conditions in the abdomen requiring treatment through an incision in its walls which do not readily lend themselves to a single, expressive term—for instance, omental tumours, cysts of the mesentery and echinococcus colonies—so that it becomes convenient to use the term cœliotomy as expressing an operation by which the belly is opened by a cut.

In all the operations described in this section the important step is to gain entrance into the cœlom (or peritoneal cavity) by an incision in its parietes, most frequently through the linea alba; it will therefore be convenient to describe the mode of preparation of the patient, the requisite instruments, and the manner of carrying it out.

Preparation of the Patient.—It is advantageous to keep the patient confined to bed for two or three days preceding the operation, and she is prepared as for any other serious surgical proceeding. The rectum should be emptied, preferably by enemata. Soap is a common constituent of enemata, but it is very apt to produce a well-marked red papular rash, especially if the enema be retained for a time. The **enema rash** is often irritating, and usually alarms patients from its resemblance to scarlet fever, etc. It may be avoided by using soft-soap. The patient abstains from food at least six hours before the operation—this diminishes the chances of vomiting. The nurse shaves the pubes, and washes the abdomen with warm soap and water. Six hours previous to the operation the lower part of the belly is swathed in a compress soaked with an antiseptic solution (such as carbolic acid 1 in 60, or perchloride of mercury 1 in 2,000). Immediately before the patient is placed on the table the bladder should be emptied naturally or by means of a glass catheter. In all abdominal operations it is a great advantage to employ nurses who have had special training in "abdominal nursing."

Instruments.—All instruments employed in performing cœliotomy are constructed of metal, as this enables them to be thoroughly sterilized by boiling. The following are always necessary: A scalpel, twelve hæmostatic forceps, two dissecting forceps, scissors, needles, silk, cotton-wool dabs, sponge-holders.

All dabs and instruments should be counted, and the number written down before the operation is begun.

Instruments are immersed in hot water and the dabs washed in water (at 100° F.) during the operation.

Suture and Ligature Material.—The most useful material at present employed in abdominal surgery is silk. This material has a wide range of usefulness, as it is employed to secure pedicles, for the ligature of vessels, and for sutures. Silk may be easily sterilized. It is convenient to wind the thread on a glass spool and then boil it in the sterilizer for one hour immediately before an operation. Sets of these spools provided with silk of three degrees of thickness answer most purposes—a stout silk for ordinary pedicles; a thinner silk for vessels, omental adhesions, or sutures for the skin; and fine silk for securing torn surfaces of bowel.

Many surgeons hold catgut in high esteem; we do not share this opinion.

Dabs (*Artificial Sponges*).—Nothing is so convenient for removing blood from a wound as sponges: their absorbent powers and softness are excellent; but they are difficult to sterilize; therefore sponges have been banished from surgery, as they are highly dangerous. An excellent substitute is absorbent cotton-wool enclosed in gauze (gamgee tissue), or compressed squares of moist cotton-wool or simple folds of gauze. This material can be cut to any size or folded into any shape, and is easily sterilized by heat or by boiling without damage to the absorbent properties of the material. Moreover, cotton-wool and gauze are so cheap and easily obtainable that dabs should be used for one operation and then burned.

Gloves (see Chapter L.).

The Table.—In many cases of cœliotomy a table such as is employed for any ordinary surgical operation answers very well. But for hysterectomy, oöphorectomy, and similar purposes it is a very great convenience to have a table on which the patient can be placed in the Trendelenburg position, that is with the pelvis raised and the head and shoulders lowered; this allows the intestines to fall towards the diaphragm, and leaves the pelvis unencumbered. When the table is raised in order to elevate the pelvis the patient's arms should lie parallel with the trunk, otherwise if they fall backwards, or are allowed to hang over the edge of the table, troublesome musculo-spiral paralysis will be a probable result. In lowering the table after the operation the patient's hands run some risk of being squeezed in the framework unless care is exercised.

Anæsthesia.—Some surgeons prefer chloroform or the A.C.E. mixture; others employ ether. Ether administered by a skilful anæsthetist is the safest agent yet discovered for prolonged anæsthesia.

The Abdominal Incision.—The patient being completely unconscious, the operator, with his assistant opposite him, divides the skin and fat in the middle line of the belly, between the umbilicus and the pubes, for a space of 7 to 10 centimetres. This incision should reach to the aponeurotic sheath of the rectus; any vessels that bleed freely require seizing with hæmostatic forceps. The linea alba is then divided, but as it is very narrow in this situation the sheath of the right or left rectus muscle is usually opened. Keeping in the middle line, the posterior layer of the sheath is divided and the subperitoneal fat (which sometimes resembles omentum) is reached; in thin subjects this is so small in amount that it is scarcely recognisable, and the peritoneum is at once exposed. In order to incise the peritoneum without damaging the tumour, cyst, or intestine a fold of the membrane is picked up with forceps and cautiously pricked with the point of a scalpel; air rushes in, destroys the vacuum, and generally produces a space between the cyst (or intestines) and the belly wall; the surgeon then introduces his finger, and divides the peritoneum to an extent equal to the incision in the skin.

It is important to remember that the bladder is sometimes pushed upward by tumours, and lies in the subperitoneal tissue above the pubes; it is then apt to be cut.

On entering the cœlom (peritoneal cavity), the surgeon introduces his hand, and proceeds to ascertain the nature of any morbid condition that he sees or feels, or he evacuates any free fluid, blood, or pus which may be present. Occasionally he finds that attempts to remove a tumour would be futile or end in immediate disaster to the patient; then he desists and closes the wound, and the procedure is classed as an exploratory cœliotomy. Should a removable tumour, such as an ovarian cyst, an echinococcus colony of the omentum, or the like, be found it is removed.

The recesses of the pelvis are then carefully mopped in order to remove fluid, blood, or pus; the dabs and instruments are counted, and preparations made to suture the incision.

Closure of the Wound.—This consists in suturing each layer separately. The peritoneum is first secured by a continuous suture of fine silk. The sheath of the rectus is then brought together by interrupted sutures of silk. Lastly, the skin is secured by interrupted or continuous sutures of silk or other material, according to the fancy of the operator. The great advantage of this *triple method* is that it minimizes the risk of a yielding cicatrix, and obviates the use of an abdominal belt.

Dressing.—This should be very simple. A fold of sterilized gauze or cyanide gauze, covered with two or three pads of cotton-wool or gamgee tissue, retained in position by a flannel binder fastened with safety-pins, is sufficient.

Irrigation.—When the cœlom (peritoneal cavity) contains free blood, pus, fæcal matter, etc., previous to or during the performance of cœliotomy, such fluids are most expeditiously removed by thorough irrigation with water at a temperature of 110° F. The precise method matters but little. In well-appointed operating theatres an apparatus for irrigating the belly is certain to be present. In private practice much depends on the ingenuity of the surgeon.

Plain water that has been boiled and allowed to cool to the requisite temperature is the safest medium for peritoneal irrigation. In operations on the pelvic viscera irrigation is very rarely required.

Drainage.—After the removal of an adherent tumour or uterine appendages blood may ooze from a number of points too small or inaccessible to permit the application of ligatures. In such circumstances it is sometimes desirable to insert a narrow strip of gauze to act as a drain.

The gauze should reach to the floor of the recto-vaginal fossa, while its upper end projects from the lower angle of the wound. The cutaneous orifice is surrounded by absorbent dressing to receive the escaping fluid. As a rule there is at first a free escape of blood or blood-stained serum, and the dressing requires frequent changing; at the end of twenty-four hours it rapidly diminishes. The gauze may be withdrawn in thirty-six or forty-eight hours.

Transfusion.—A simple apparatus for this purpose consists of a yard of indiarubber tubing to which a funnel is attached. The opposite end of the tube is fitted with a glass (or metal) nozzle with the point fine enough to enter the median basilic (or the median cephalic) vein. The nozzle is introduced into the vein and secured by a silk ligature, and 2 to 3 pints of saline solution, consisting of a teaspoonful of clean table salt (chloride of sodium) to a pint of water at a temperature of 100° F. are allowed to slowly run into the vein. The effect is often magical. Two to three pints is sufficient, as a greater quantity will lead to œdema of the lungs.

CHAPTER LVI

OVARIOTOMY AND OÖPHORECTOMY

Ovariotomy.—This term signifies the operation for the removal through an incision in the abdominal wall of tumours and cysts of the ovary and the parovarium. (For the preparation of the patient and the necessary instruments, see p. 486.)

Steps of the Operation.—As soon as the operator enters the cœlom (peritoneal cavity) and recognises the bluish-gray glistening surface of an ovarian cyst, he inserts his hand and passes it over the wall of the tumour to ascertain the presence or absence of adhesions. Instead of a typical ovarian cyst he may find a solid tumour or an enlarged uterus; secondary nodules may exist on the peritoneum and indicate a malignant tumour, or adhesions may be so strong and so numerous that it will be undesirable to continue the operation.

It is of the highest importance to be satisfied as to the nature of the tumour before proceeding further; to plunge a trocar into a pregnant uterus or a fibroid is an accident sure to involve the operator in anxious difficulty.

Removal of Cyst.—Feeling satisfied that the tumour contains fluid, is not connected with the uterus, and is removable, the operator proceeds to lift it out of the abdominal cavity. In the case of a large tumour it will be necessary to extend the incision upwards. The length of the incision is a matter of less consequence than the removal of the tumour entire.

We are strongly in favour of removing even the largest cysts entire in order to avoid infecting the peritoneum with malignant cells. In exceptional cases the cyst will require emptying before it can be removed; for this purpose the trocar may be used. A simpler plan is to make an opening into the cyst with a scalpel and introduce one end of a long rubber tube. With a little adroitness this can be managed quite easily. As the fluid escapes by the tubing into a receptacle under the table the cyst collapses, and its wall, seized with forceps, is gradually drawn out of the belly through the incision, whilst the assistant keeps the belly wall in apposition with the cyst by gentle pressure until the pedicle is reached. Emptying the cyst is not always so simple. The fluid is sometimes viscid like jelly, or in the case of dermoids resembles paste. Then it is necessary to make a free opening into the tumour, and remove its contents with the hand. It is occasionally necessary, in multilocular cysts containing clear fluid, to introduce the fingers, or even the hand, to break down secondary loculi.

Adhesions.—Large portions of omentum may require detachment, transfixion, and ligature with thin sterilized silk to arrest the bleeding. Intestinal adhesions require care and patience; adhesion to the peritoneum in the pelvis is often a source of great difficulty, and care must be taken not to damage the ureters or large vessels, such as the vena cava and the iliac veins.

Adhesions to the bladder are rare, and require great care; it is wise to introduce a sound into the bladder whilst separating it from the cyst.

The Pedicle.—When the tumour is withdrawn from the belly the pedicle is usually easily recognised; the Fallopian tube serves as an excellent guide to it. The pedicle consists of the Fallopian tube and adjacent parts of the mesometrium containing the ovarian artery, pampiniform plexus of veins, lymphatics, nerves, and the ovarian ligament. When the constituents of the pedicle are unobscured by adhesions the round ligament of the uterus is easily seen and need not be included in the ligature.

In transfixing the pedicle the aim should be to pierce the mesometrium at a spot where there are no large veins, and tie the structures in two bundles, so that the inner contains the Fallopian tube, a fold of the mesometrium, and occasionally the round ligament of the uterus, whilst the outer consists of the ovarian ligament, veins, the ovarian artery, and a larger fold of peritoneum than the inner half.

Pedicles differ greatly ; they may be long and thin, or short and broad. Long thin pedicles are easily managed. The assistant gently supports the tumour whilst the operator spreads the tissues with his thumb and forefinger, and transfixes them with the pedicle needle armed with a long piece of silk. The loop of silk is seized on the opposite side and the needle withdrawn. During the transfixion care must be taken not to prick the bowel with the needle. The loop of silk is cut so that two pieces of silk thread lie in the pedicle. The proper ends of the threads are now secured, and each is firmly tied in a reef-knot ; for greater security the whole pedicle may be encircled by an independent ligature, taking care that it embraces the pedicle below the point of transfixion.

After the operator has gained some experience in this simple mode of tying the pedicle he may, if he thinks it desirable, practise other methods.

After securely applying the ligature the tumour is removed by snipping through the tissues on the distal side of the ligature with scissors. Care must be taken not to cut too near the silk, or the stump will slip through the ligature ; on the other hand, too much tissue should not be left behind. The stump is seized on each side by pressure forceps, and examined to see that the vessels in it are secure ; it is then allowed to retreat into the abdomen. Should it commence to bleed it must be retransfixed and tied below the original ligature. Occasionally a broad short pedicle will contain so much tissue that it will be necessary to tie it with three threads.

It is impossible to frame absolute rules for ligaturing the pedicle. In this, as in all departments of surgery, common sense must be exercised, and at the present day, when ovariotomy is practised so widely, no one would think of performing this operation without assisting at, or watching its actual performance by an experienced surgeon.

Having satisfied himself that the pedicle is secure, the surgeon examines the opposite ovary, and if obviously diseased it should be removed.

The operator then sponges up any blood or fluid which may have collected in the recesses of the pelvis. Whilst employed in this way he gives instructions to have the dabs and instruments counted.

When the operator limits the number of dabs to six he can easily have them displayed before him. The incision is sutured in the manner described on p. 489.

Sessile Cysts.—It occasionally happens that the surgeon exposes a cyst in the pelvis through an abdominal incision, and finds he cannot withdraw the cyst wall from the pelvis.

Sessile cysts of this kind are removed by what is known as enucleation. The peritoneum overlying the cyst is cautiously torn through with forceps until the cyst wall is exposed; then by means of the forefinger the surgeon proceeds to shell the cyst out of its bed, taking care not to tear the capsule or any large vein in its wall; it is also necessary to exercise the greatest care to avoid injury to the ureter. It is not uncommon, after enucleating a cyst in this way, to find the ureter lying at the bottom of the recess.

When the enucleation is complete the operator carefully examines the walls of the capsule for oozing vessels, and ligatures them. The capsule can often be closed in such a way as to obliterate its cavity, and it then requires no further attention. In other cases, and nearly always when there is a tendency to oozing, the capsule is treated by the plan known as *marsupialization*. The edges of the capsule are then brought to the margins of the abdominal wound, and secured with sutures to the peritoneum. It is occasionally useful to introduce a thin gauze drain. The abdominal incision is closed in the usual way, and the wound is dressed.

The capsule of a sessile cyst requiring treatment of this character is formed by the divaricated layers of the mesometrium (broad ligament); and occasionally it is a spurious capsule due to the organization of the so-called inflammatory lymph, especially in connection with true ovarian cysts.

Enucleation is needed for:

(*a*) Papillomatous cysts and cysts of Gartner's duct burrowing deeply between the layers of the mesometrium.
(*b*) Fibroids and other solid tumours of the mesometrium.
(*c*) Very large examples of hydrosalpinx and pyosalpinx.
(*d*) Some ovarian cysts, especially suppurating dermoids.
(*e*) Tubal pregnancy in the mesometric stage.

Enucleation is usually accompanied by more loss of blood than simple ovariotomy, and the prolonged manipulation is often responsible for severe shock.

Incomplete Ovariotomy.—The surgeon may start on an operation, and after opening the abdomen may find many adhesions, yet feel that the removal of the tumour is possible. He sets to work, overcomes many of the difficulties, then suddenly finds such extensive and firm adhesions to important structures at the floor of the pelvis that he deems it imprudent to proceed. In such a case he evacuates the contents of the cyst, and if it be an adenoma, the semi-solid contents are freely removed, and the edges of the cyst are stitched to the abdominal wound as described in the preceding section, and the cavity drained. This mode of dealing with a cyst is usually termed "incomplete ovariotomy."

An incomplete ovariotomy is a very different condition to an enucleation. The cavity left after enucleation closes completely, but when the wall of an ovarian cyst or adenoma is left the tumour gradually reappears, or it may suppurate so profusely that the patient slowly dies exhausted. There are few things sadder in surgery than the slow miserable ending of an individual who has been subjected to an incomplete ovariotomy.

Anomalous Ovariotomy.—In a few instances, generally under an erroneous diagnosis, surgeons have removed ovarian tumours through an incision other than the classical one in the linea alba. Under the impression that the tumour was splenic an ovarian tumour of the right side has been successfully removed through an incision in the left linea semilunaris.

An ovarian tumour supposed to be a renal cyst has been successfully extracted through an incision in the ilio-costal space.

Strangest of all, a small ovarian dermoid has been removed through the rectum under the impression that it was a polypus of the bowel.

Repeated Ovariotomy.—Very many cases are known in which women have been twice submitted to ovariotomy. Thus it is the duty of the surgeon when removing an ovarian tumour to examine carefully the opposite ovary. So many examples are known of women who have borne children after unilateral ovariotomy (twins and even triplets) that this alone is sufficient to prohibit the routine ablation of both glands.

A second ovariotomy is not attended with more risk than the first, but more care is needed in making the incision, for should a piece of intestine be adherent to the cicatrix it would be very liable to injury.

Oöphorectomy.—This signifies the removal of the ovaries and Fallopian tubes through an abdominal incision, for affections mainly inflammatory, also the removal of healthy ovaries and tubes in order to anticipate the menopause.

This operation is performed for the relief of a variety of diseases connected with the internal reproductive organs :

1. **Tubal Diseases,** such as pyosalpinx and tubo-ovarian abscess, hydrosalpinx, tubercular salpingitis, tumours of the tube—adenoma, carcinoma, gravid tubes, hæmatosalpinx, etc.

2. **Ovarian Diseases** ; as, for example, ovarian abscess, apoplexy of the ovary, hernia of the ovary, prolapse of the ovary, and ovarian pregnancy.

3. Oöphorectomy has been performed in order to anticipate the menopause in hystero-epilepsy, epilepsy, some forms of insanity, dysmenorrhœa, unassociated with demonstrable diseases in the ovaries, and in uterine fibroids, but we do not recommend the performance of the operation for these conditions.

Steps of the Operation.—The patient is prepared as for ovariotomy, and the instruments needed are the same with the exception of the trocar. The Trendelenburg position is of great advantage, as it enables the surgeon to view distinctly the depths of the pelvis.

The abdomen is opened in the usual manner and situation ; the surgeon then seeks the fundus of the uterus, and with this as a guide he is able to find the ovary and Fallopian tube. When the parts are not adherent it is a very simple matter to seize the ovary and tube, draw them into the incision, and retain them in position by ovum forceps, whilst the broad ligament is transfixed and secured with silk ligatures. When the tubes are filled with pus and fixed with firm adhesions to the floor of the pelvis, and perhaps intestine, the manipulations necessary to detach the tubes and ovaries from their surroundings demand great care and the exercise of much patience.

When the tubes are in the condition of pyosalpinx the tubal tissues are in places so thin that even under the most cautious fingers the sac bursts and septic fluid rushes into the pelvis.

On the other hand, the ovaries may be so firmly fixed to the floor of the pelvis that they break, and portions of ovarian tissue are left; this often impairs the subsequent results, as menstruation continues if only a small portion of an ovary is left.

In order to perform oöphorectomy satisfactorily the essential point is to be able to bring the ovaries and tubes into the wound to permit the application of the ligatures; these are applied in exactly the same manner as in ovariotomy. The assistant must be especially careful to avoid dragging on the tubes and ovaries, for they tear easily, and the ligatures need to be very cautiously tied, as any jerking is very apt to lacerate the tissues and necessitate retransfixion. When the pedicles are very thick it is often an advantage to carefully cut through the pedicle and secure the bleeding points separately. The very large mass ligatures often give rise to an abscess.

After-treatment.—This is conducted on the same lines as after ovariotomy.

The dangers are the same, but oöphorectomy when undertaken for infective conditions is attended with greater risk to life than ovariotomy. It is, however, important to remember that the greatest operative risk is with those cases in which the necessity for surgical interference is the greatest.

When oöphorectomy is performed for pyosalpinx there is risk with the pedicle, because its tissues are often infected, and this may cause it to slough and set up fatal peritonitis or give rise to an abscess in the stump which may burst through the scar, the rectum, or bladder.

The *sequelæ* are the same as after ovariotomy.

The After-treatment of Ovariotomy.—The patient is returned to a warm bed with gentleness to avoid vomiting; a pillow is placed under her knees. Care must be taken that the hot-water bottles do not come in contact with the patient's skin so as to cause blisters. It is a good rule *that hot-water bottles should not be allowed in bed with an unconscious patient.* As consciousness returns, pain is complained of, and if severe it may be relieved by morphia, either subcutaneously or in the form of a suppository. The routine use of this drug is injudicious.

Vomiting.—This troublesome complication is best prevented by keeping the stomach empty at least twenty-four hours. If there is faintness or shock, stimulants, such as brandy and water, or even milk, beef-tea, or the like, may be administered by the rectum. The bowel will retain 8 or 10 ounces of normal saline solution at a temperature of 100° F. slowly injected. In some cases the vomiting persists for two or more days, and when accompanied by increased frequency of pulse and distension of the belly it is usually an unfavourable sign.

Diet.—At the end of twenty-four hours small quantities of barley-water, water, or milk and soda-water may be given by the mouth at regular intervals; at the end of three days the bowels should be relieved by an enema, and then boiled fish or fowl may be allowed, and the patient soon requires convalescent diet.

Distension of the abdomen is due to the accumulation of gas in the intestines. It is usually first observed in the transverse colon. The administration of morphia predisposes to it. It occasions in some cases much discomfort, and it is not always easy to relieve it. The passage of the rectal tube every three hours as a matter of routine is useful, or the administration of an enema made of soft-soap and water and half an ounce of turpentine.

The Bladder.—The urine requires to be drawn off by the nurse every eight hours, or oftener if the patient requires it, by means of a sterilized glass catheter. Before passing the catheter the nurse wipes the orifice of the urethra so that no mucus is conveyed from the vulva into the bladder. It is a good plan to encourage patients to pass water unaided.

Bowels.—At the end of four or five days the bowels will occasionally act of their own accord. Usually, however, it is necessary to use a simple enema, and this is in the majority of cases quite sufficient. When opium has been freely administered still more active measures will be required.

Temperature.—This should be observed every four or six hours, and duly recorded in the notebook. The first record after the operation is usually subnormal; in twelve hours it becomes normal, and may even be raised half a degree. During the first twenty-four hours it may ascend to 100° F. without causing alarm; beyond this, especially if accompanied by a rapid pulse, an anxious face, and distended belly, it is sufficient to make the surgeon anxious. A temperature of 101° or 102° F., unaccompanied by other unfavourable symptoms, is not a cause for alarm unless maintained. The very high temperatures which used to alarm surgeons were due to absorption of carbolic acid, especially when the spray was in fashion.

Pulse.—This is a valuable guide, and even more trustworthy than the temperature. When the pulse remains steady and full there is no cause for alarm. When it increases in frequency to 120 or 130 or more beats in the minute, and is thin and thready, then there is danger even with the temperature only slightly raised. A very rapid feeble pulse is often an indication of internal hæmorrhage.

Metrostaxis.—After operations for the removal of both ovaries and tubes blood sometimes escapes from the uterus and simulates menstruation. It usually begins within the first forty-eight hours after the operation. Metrostaxis occurs in about one-half the cases, and has nothing whatever to do with menstruation.

Sutures.—On the seventh or eighth day the superficial sutures will require removal.

Bed-sores may give trouble after ovariotomy in an elderly and enfeebled patient, as after any other surgical procedure which requires the patient to remain for several consecutive days upon her back. With due care and watchfulness on the part of the nurse a bed-sore should not occur.

The Risks of Ovariotomy.—The performance of ovariotomy is attended by several risks; the chief are indicated in the subjoined list: (1) Shock; (2) injury to viscera; (3) bleeding; (4) peritonitis; (5) foreign bodies left in the belly; (6) tetanus; (7) parotitis (septic); (8) insanity; (9) thrombosis and embolism.

1. **Shock.**—The amount of physical disturbance clinically termed "shock" varies greatly. The removal of even a small ovarian tumour may be followed by great collapse, which occasionally terminates in death. It is more common after prolonged operations and enucleation of tumours from the mesometrium.

Unless shock has been intensified by great loss of blood during the operation it usually disappears in six or twelve hours. The degree of shock may be gauged by the fall of the body temperature and the duration of the depression. The deepest shock in these operations often accompanies unusual loss of blood. It is no uncommon thing for the temperature to fall to 96° F. after a severe operation, and then in a few hours it will rise to 99° or 100°. This causes no alarm, but post-operative shock with the temperature at 96° or lower, which does not rise in twelve hours, needs consideration, and it is wise to resort to restoratives such as injections of warm water, beef-tea, or milk, by the rectum, with a small quantity of brandy added.

2. **Injury to Viscera.**—Those most liable to injury during ovariotomy are—(*a*) The intestines; (*b*) the bladder; (*c*) the ureters; (*d*) the gravid uterus.

(*a*) *Intestines.*—These may be cut or lacerated in making the abdominal incision; more frequently they are torn in detaching adhesions. The vermiform appendix has been divided before its nature was suspected. The bowel has been pierced by the pedicle needle whilst passing the ligatures, and has even been tied to the pedicle. In suturing the abdominal wall the intestines have been not only pricked but accidentally stitched to the belly wall.

Wounds of intestine should be immediately sutured with fine silk. A wound of intestine overlooked is almost certainly fatal.

(*b*) *The Bladder.*—A full bladder has been punctured with a trocar in mistake for a cyst; it has been opened in making the abdominal incision and torn in separating adhesions. Wounds of the bladder should be immediately closed with fine silk sutures.

(*c*) *The Ureter.*—This duct has been torn in separating adhesions on the floor of the pelvis and at the brim of the pelvis. It is especially liable to damage during the process of enucleating tumours from the mesometrium and in the operation known as total hysterectomy.

Small wounds may be closed with a suture. When the duct is completely divided the upper end should, if possible, be invaginated into the lower; failing this, the proximal end is brought out of the wound. This often entails a subsequent nephrectomy. A ureter accidentally divided has been successfully engrafted into the wall of the bladder.

(*d*) *Injury to a Gravid Uterus.*—When ovariotomy is undertaken during pregnancy the surgeon is necessarily on his guard against mistaking the enlarged uterus for a cyst. Injury is very liable to happen if such an error of diagnosis be made.

To plunge a trocar into a gravid uterus is a serious misfortune, and has happened on several occasions. In such conditions there are three courses open to the surgeon: (1) Perform a Cæsarean section; (2) amputate the uterus; (3) sew up the puncture without disturbing the uterine contents.

Each of these methods has been practised with success, but Cæsarean section has so far given the best results.

3. **Bleeding.**—Intermediate hæmorrhage may be due to the slipping of an ill-applied ligature from the pedicle or an adhesion. Oozing, which is scarcely appreciable when a patient is collapsed, may become very free when reaction occurs.

Severe internal bleeding is manifested by well-known signs—pallor, cold skin, rapid but feeble pulse, and sighing respiration. When these signs are manifested the wound must be reopened, the clots turned out, and the bleeding-point secured. When there has been great loss of blood the patient should be transfused with saline solution (see p. 490).

Hæmorrhage usually occurs within the first twenty-four hours. After enucleation has been practised and the broad ligament ligatured, but not drained, bleeding may take place within it and form a hæmatoma. As a rule it is slowly absorbed.

4. **Peritonitis.**—This was formerly the terror of the surgeon. Its frequency has been diminished by improved methods of dealing with the pedicle, greater cleanliness, antiseptic and aseptic precautions, and the abolition of

sponges. Peritonitis may arise from infection at the time of the operation in consequence of the escape of pus or other fluids from the interior of cysts or tumours; from sponges, compresses, and instruments inadvertently left in the abdomen; from operations conducted in rooms in which sewer gas and similar deleterious agents are present; from damage to, and subsequent sloughing of portions of the viscera, especially bowel; gangrene of the stump, pieces of adherent cyst wall, or adhesions; from decomposition of blood carelessly left in the pelvis, or from *the operator's hands*.

Its occurrence in a fatal form is not likely to be mistaken. The pulse is rapid (120, 130, or 140), at first full and bounding, then quickly becoming thin and feeble. The temperature may be subnormal, then slowly rise to 100°, 102°, or 103° F., or the onset may be marked by a rigor, followed by rapid rise of temperature. These signs, accompanied by vomiting, the fluid being bile-stained or like black coffee, an anxious and pinched face, a dry brown tongue, sunken eyes, and distended abdomen, form a picture never mistaken when once seen. Death is rarely long delayed.

5. **Foreign Bodies Left in the Abdomen.**—Every writer on ovariotomy insists on the importance of exercising the utmost personal vigilance in counting instruments, and especially sponges, after an abdominal operation. Nearly all the cases in which foreign bodies are left in the abdomen end fatally, and more than one writer has expressed the opinion that the accident has probably been overlooked when no post-mortem examination was made.

Besides sponges and forceps, such things as pads of tarlatan, iodoform gauze, and a glass drainage tube have been left in the abdomen.

In a few lucky cases a sponge or compress has given rise to an abscess, and the foreign body has been discharged, sometimes through the belly wall, sometimes through the anus.

Forceps thus left behind have made their way into the bladder, the cæcum, or have escaped at the navel many months after the operation.

6. **Tetanus.**—Since the clamp has been banished tetanus rarely attacks the abdominal wound. Ovariotomy should not be performed in rooms recently plastered. In practice it is to be remembered that tetanus arises from infection, and all instruments which have been in contact with a case of tetanus should be sterilized by prolonged boiling.

7. **Parotitis.**—Inflammation of the parotid gland is apt to complicate injuries to, and operations upon and in, the abdomen. One or both glands may be affected, and in a large proportion of cases suppuration occurs. This form of parotitis runs no regular course; it may subside and recur in the course of the convalescence from the original injury or operation.

8. **Insanity.**—Acute mania occasionally complicates the convalescence from ovariotomy. It was common during "the reign of the carbolic spray." In the majority of cases it quickly subsides.

9. **Vascular Disturbances.**—Thrombosis of the iliac veins sometimes follows ovariotomy, and gives rise to œdema, usually of one leg.

Embolism.—In perusing the clinical histories of a long series of cases of ovariotomy, or of hysterectomy, here and there a record may be read to this effect: "The patient did well after the operation till the eighth day; the sutures were taken out and the patient sat up, laughed and chatted with the nurse, then suddenly fell back dead." Anything more awfully tragic than this it is difficult to conceive, and, as a rule, after such a sad occurrence the relatives of the patient are so upset that they very rarely permit an examination of the body.

Death in such circumstances is attributed to embolism of the pulmonary artery. This in many cases is pure assumption, for there are excessively few records in which the presence of the embolism has been demonstrated.

Sudden death seems to be a more frequent sequel to abdominal hysterectomy than to ovariotomy. It is well to bear in mind that a patient may after hysterectomy exhibit the signs of pulmonary embolism and recover, and curiously enough a patient may have signs suggesting a succession of emboli.

The Sequelæ or Remote Risks of Ovariotomy.—These include: (1) Intestinal obstruction; (2) perforation of the intestine; (3) trouble with the ligature; (4) yielding cicatrix.

1. **Intestinal Complications.**—It is difficult to estimate with any approach to accuracy the relative frequency of intestinal complications following ovariotomy. The danger is nevertheless real.

Intestinal obstruction may be acute or chronic—may supervene within a few days of the operation or be delayed for months or years. The causes are fourfold: (*a*) The formation of a band; (*b*) adhesions to the pedicle; (*c*) adhesions to the cicatrix; (*d*) strangulation in the sac formed by a yielding cicatrix.

2. **Perforation of Intestine.**—This arises from damage to the wall of the gut in separating adhesions. The rectum is the most frequent seat of this accident. When a fæcal fistula arises after operation, if it be carefully drained, as a rule it closes spontaneously, sometimes in a few days, more commonly in a few weeks, and rarely it runs for a few months.

3. **The Ligature.**—When a piece of silk thread or whip-cord, thoroughly sterilized by boiling, is applied to a healthy pedicle, it causes no evil consequences, and is either encysted or slowly removed by the aggressive leucocytes.

The thread disappears in about a year, but the knots require at least an additional six months.

When the tissues of the pedicle are infiltrated with inflammatory products, especially when the Fallopian tube is septic, the ligature, instead of being absorbed, excites inflammation and becomes surrounded with pus. An abscess around the pedicle may give rise to the following complications: (*a*) Fatal peritonitis; (*b*) the abscess may open through the abdominal cicatrix and form a sinus; (*c*) it may perforate the rectum, intestine, or even the bladder; (*d*) the loop of silk may pass down the stump of the Fallopian tube and escape through the uterus.

When a sinus results from an abscess of the pedicle it usually persists until the ligature is discharged; this may require many months. When the ligature escapes into the bladder, it may form the nucleus of a vesical calculus.

4. **The Cicatrix.**—One of the most troublesome and frequent sequelæ of ovariotomy used to be a yielding cicatrix, which allowed the formation of a large ventral hernia. In very many cases these herniæ caused more trouble than the disease for which the operation was performed, besides being a source of danger. The inconvenience of wearing a belt is such that many women prefer to run the risk of hernia rather than be encumbered with such an apparatus. When the abdominal incision is closed with a triple series of sutures, as described on p. 489, the chance of a yielding cicatrix is very slight, and the belt may be discarded.

Cancer of the Cicatrix.—Cases have been reported in which, after removal of ovarian adenomata, tumours similar in structure have appeared in the scar. In some cases such tumours have been associated with wide dissemination due to recurrence of a malignant tumour; in others the tumour has been attributed to direct infection of the wound during removal of the primary tumour.

The Remote Effects of Ovariotomy on the Primary and Secondary Sexual Characters.—The removal of one ovary has no effect upon women, and a large number of instances have been reported in which pregnancy has followed unilateral ovariotomy.

The complete removal of both ovaries is followed in adult women by *sterility* and persistent *amenorrhœa*, and these are the only two constant effects which can be attributed to it.

The amenorrhœa is practically an artificial menopause, and is usually accompanied by that peculiar vaso-motor phenomenon characteristic of the "change of life" familiar to climacterics as "flushes." The influence of double ovariotomy on the sexual passion is hard to estimate, and cannot be taken into account when the life of the individual is directly concerned. Women have lived happily with their husbands after removal of both ovaries; and facts are accumulating which tend to show that the ovaries are not the seat of the sexual passion. The nubility of women after double ovariotomy is a difficult question. It is certain that many women

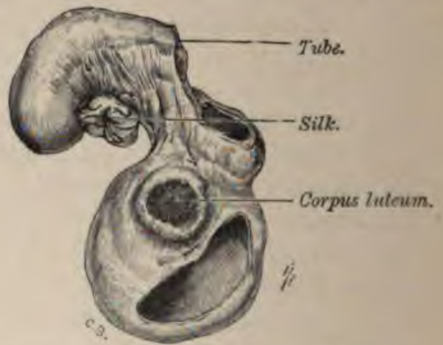


FIG. 128.—STUMP OF FALLOPIAN TUBE AND FRAGMENT OF OVARY WITH CORPUS LUTEUM, LEFT AFTER A SUPPOSED COMPLETE DOUBLE OÖPHORECTOMY.

have married after removal of both ovaries. Some cases have been recorded by competent observers in which women have undergone bilateral ovariotomy, and years afterwards have given birth to living children. Many cases have also been reported in which menstruation has continued after bilateral oöphorectomy. However, careful inquiry, and in many cases a second operation, has proved that a fragment of ovary was left (Fig. 128). Such a retained portion of ovary is sufficient to maintain not only menstruation but ovulation, and it will form corpora lutea. Irregular uterine hæmorrhages occur sometimes after complete double oöphorectomy performed for septic salpingitis. Such bleeding is sometimes severe enough to demand hysterectomy for its relief. Hæmorrhage of this kind is in no sense menstruation.

There is no evidence that complete removal of both ovaries in a mature woman leads to any unusual development of the secondary sexual characters or atrophy of the breasts. It may cause obesity in a woman who has a tendency to form fat. Women are liable after an " artificial menopause " to the same peculiar mental depression and irritability which characterize the normal " change of life."

CHAPTER LVII

OPERATIONS ON THE UTERUS

ABDOMINAL MYOMECTOMY AND ENUCLEATION; HYSTERECTOMY; HYSTEROPEXY; AND CÆSAREAN SECTION.

Abdominal Myomectomy.—*This signifies the removal of one or more pedunculated subserous fibroids, through an incision in the abdominal wall, preserving the uterus, ovaries, and Fallopian tubes.*

The preliminaries and instruments for operations on the uterus are those recommended for ovariotomy. It is of the greatest advantage to have the patient in the Trendelenburg position. The abdomen is opened in the situation and manner and with the same precautions as for ovariotomy, except that the incision is much longer. The intestines are carefully protected with a warm compress, and the tumour is withdrawn through the incision and its pedicle examined. When the stalk is narrow it may be transfixed and secured with silk sutures like an ovarian pedicle. When broad and short the tumour may be shelled out and its capsule used as a pedicle. When the transfixing ligatures are securely knotted and the redundant portions cut away, it is useful to bring the opposed edges together with a continuous suture of fine silk.

Myomectomy is an excellent operation, though it has a limited application. The after-results are admirable, as the surgeon leaves not merely the ovaries and tubes, but the uterus. When age and environment are favourable, the patient may conceive. In several cases pregnancy occurred, and terminated successfully (Bland-Sutton).

Abdominal Enucleation.—*In this operation a sessile fibroid is shelled out of its capsule; the uterus, ovaries, and Fallopian tubes are preserved.*

The uterus and tumour are exposed as directed in myomectomy, and the capsule freely incised; the tumour is then shelled out of its bed. During this process the bleeding is controlled by grasping the uterus firmly with the left hand; on relaxing the uterus blood freely issues from the vessels in the capsule, and they are seized with hæmostatic forceps and ligatured with thin silk. When the oozing is controlled the cut edges of the capsule are secured with interrupted sutures of silk. The incision is then closed in the usual manner.

In some cases, especially with a large fibroid, the edges of the capsule are secured by sutures to the margins of the parietal incision, and the bed of the tumour stuffed with gauze. It is often an advantage to incise the capsule so as to establish a communication with the cavity of the uterus. This allows any blood or serum which oozes to escape by the vagina. It has, however, the drawback of opening the way to sepsis if the endometrium be infected.

It is admitted by all operators that enucleation is the ideal method of treating uterine fibroids so large as to require cœliotomy, because the uterus is preserved as well as the ovaries. This sounds reasonable, but when carefully considered the advantages are really not very important. It has already been pointed out that most fibroids arise after the child-bearing period, that is, when the uterus has become functionless; in these circumstances its retention is a matter of sentiment, and it is unwise to unduly risk a woman's life in order to preserve a useless organ. In the case of a patient under thirty, especially a single woman anticipating marriage, there is some reason in advising her to submit to increased risk in the hope that she may become a mother. The chances are small, but with interstitial and subserous tumours they are sometimes realized.

It is important to bear in mind that a large fibroid has been enucleated and a small one has remained undetected; this subsequently grows and necessitates hysterectomy (see Latent Fibroids, p. 203). Experience, however, teaches this stern lesson: *After the enucleation of a fibroid in the procreative period of life a woman is twenty times more likely to grow fibroids in her womb than to conceive successfully.*

In exceptional cases enucleation is a desirable measure, but as a routine method in the surgical treatment of uterine fibroids requiring cœliotomy conservative hysterectomy is easier, safer, and quicker.

Hysterotomy.—*This signifies the removal of a submucous fibroid through an incision in the walls of the uterus which opens the uterine cavity.*

The operation is carried out on exactly the same lines as in abdominal enucleation, but the uterine incision is closed as in Cæsarean section (see p. 520).

Subtotal Hysterectomy (*Supravaginal Hysterectomy*). —*This term signifies the removal of the uterus with a variable portion of the supravaginal segment of the cervix.*

The Incision.—The abdomen is opened by a free cut in the linea alba between the navel and the symphysis pubis. With a large tumour the incision will often require extension above the umbilicus; it is necessary to cut cautiously in the neighbourhood of the pubes to avoid wounding a displaced bladder.

On gaining the peritoneal cavity the intestines should be at once protected by means of a warm flat dab. The tumour is then examined, and the relation it bears to the uterus determined, also the presence or absence of complications, such as the coexistence of ovarian tumours, visceral adhesions, or distended tubes. The operator then proceeds to ligature the bloodvessels, and as this is one of the most important steps in the operation it requires to be considered in detail. The arteries and veins of the uterus follow four distinct routes, and each route is easily accessible to, and capable of being safely controlled by, a ligature.

When possible the tumour is drawn out of the pelvis, and each mesometrium is transfixed with a pedicle needle armed with a thread of plaited silk so as to secure the ovarian vessels on the inner or outer side of the ovary, according as it is decided to remove or leave this organ. In some cases, apart from the physiological advantage, it is safer and more convenient to secure the ovarian artery in the mesosalpinx on the uterine side of the ovary. The silk is firmly secured, and the tissues between it and the uterus are divided, and any bleeding vessel is secured with hæmostatic forceps.

In many cases a fibroid intrudes between the Fallopian tube and the round ligament, and so separates them that they cannot be safely included in the same ligature. In these circumstances it is prudent to ligature the round ligament separately; it is sometimes necessary to adopt this course on account of the large size of the ligament, for it often shares in the hypertrophy of the uterine tissues.

When the mesometria are divided the uterus becomes freer, and is easily manipulated. At this stage the uterine vessels may be detected in the vascular tract at the side of the uterus; the surgeon seizes each uterine artery with forceps.

The Peritoneal Flaps.—At this stage the sides of the uterus have been exposed by division of the mesometria. It is now necessary to determine the relation of the bladder to the uterus. The surgeon then divides the peritoneum on the anterior and posterior surface of the uterus in such a way as to make the incisions continuous with the opening in each mesometrium. These flaps are then carefully turned down. It is a great advantage to have plenty of flap, and the way the muscular tissue in the subserous tissue wrinkles them up is often very astonishing.

Amputation of the Uterus.—The uterine arteries being secured with forceps, the uterus with its tumours is cut away. If the vessels have been properly secured the cut surface of the cervical stump is usually white and dry ; but small vessels in the peritoneal flaps may bleed and require ligatures.

In the case of a **cervix fibroid** the operation is somewhat modified, thus :

The ovarian and uterine arteries are secured as described in the preceding section, and the expanded cervix with the tumour is drawn as far out of the pelvis as possible. The cervix is then incised, and the capsule of the tumour freely opened to allow the tumour to be shelled out, but leaving the vaginal portion of the cervix like a shallow cup with a central perforation (the external os). The edges of the peritoneum and the cut margins of the cervix may be brought into apposition with the same sutures.

When the cervix fibroid is of moderate dimensions and not tightly impacted, total hysterectomy is a more satisfactory, simpler, and safer operation than enucleation.

Adjustment of the Peritoneal Flaps.—The pelvis is cleared of blood and the parts carefully scrutinized to ascertain that all vessels are properly under control. Two or three interrupted sutures are then employed to fix the cut edges of the peritoneum over the stump, then the flaps are carefully brought together by a thin continuous silk suture from the ovarian pedicle of one side to that on the other. In suturing the flaps care must be exercised in order to avoid pricking the bladder. The pelvis is sponged dry, and the omentum is drawn over the intestines and spread behind the stump in the pelvis. The dabs and instruments are counted ; the wound is then secured in the usual manner.

Total Hysterectomy (*Pan-hysterectomy*).—*This signifies the removal of the uterus and its neck through an abdominal incision, and differs from the preceding method in that it leaves no stump.*

The patient is prepared as for ovariotomy, but in addition the vagina is carefully made aseptic, and it sometimes facilitates matters if the vagina is filled with aseptic gauze.

The early stages are the same as for the preceding method, and the broad ligaments are secured with silk ligatures. The bladder is stripped from the uterus, and the surgeon makes his way downward along the anterior aspect of the cervix into the vagina.

The posterior connections of the vagina and cervix are severed with scissors, and at the lateral angles the uterine arteries may be secured with ligatures before division, or they may be caught with forceps and divided, the cut end being securely ligatured with silk. The cervix is then detached from the lateral aspect of the vagina and removed. Any spouting vessel in the mesometric tissue or the cut edges of the vagina is secured with forceps, and the margins of the divided peritoneum and broad ligaments are brought into position with sutures, thus occluding the abdominal end of the vagina.

This operation is sometimes modified in the following manner: Before opening the abdomen the patient is placed in the lithotomy position, and the cervix freed from the bladder and vagina as in the first stages of vaginal hysterectomy; then the patient is placed in the Trendelenburg position, and the operation completed through the abdomen. This is a clumsy method, and we neither recommend nor practise it. It cannot be too strongly impressed on all surgeons who undertake hysterectomy that the two sets of factors which have enabled this operation to vanquish oöphorectomy in the treatment of fibroids are **rigid asepsis** and **perfect hæmostasis.**

After-treatment.—This is conducted on the same lines as for ovariotomy, and as a rule the convalescence is as quick (Chapter LVI.).

The Risks of Abdominal Hysterectomy.—The dangers are the same as those which beset ovariotomy, but the special risks are hæmorrhage, injury to one or both ureters or to the bladder, and infection of the peritoneum from the cervical canal in cases of subtotal hysterectomy, or the vagina in total removal of the uterus.

In the operation of complete removal of the uterus through the abdomen the bladder and ureters are particularly liable to injury. For instance :

1. The **bladder** is apt to be cut in making the primary incision, for it is often displaced by an enlarged non-pregnant uterus.
2. It is sometimes torn in the process of separating it from the supravaginal cervix.
3. It is liable to be punctured in suturing the peritoneal covering of the cervical stump.
4. An abscess may form in the cervical stump, and the pus, with a ligature or even the stump itself, may perforate the bladder wall.
5. The **ureters** are liable to be cut, torn, or included in ligatures.

Some teachers are of opinion that the complete removal of the uterus and its neck is the ideal operation for fibroids, because in a few instances it has been shown that the cervical stump left after the subtotal operation has been attacked by cancer. A critical examination of the reported cases shows that in some of them an unsuspected cancer existed at the time of the primary operation.

Experience teaches that subtotal hysterectomy in spinsters or barren married women, when the neck of the uterus is long and the cervical canal undilated, is as safe as any major operation in surgery. Total hysterectomy should, as a rule, be reserved for women who have had children, in whom the cervical canal is patulous, perhaps septic, and in many cases large and hard, or large and spongy. If there be the least suspicion of malignancy associated with the tumour or the endometrium, then complete removal of the uterus is imperative.

The Remote Results of Hysterectomy.—Careful observations have been made on women who have submitted to hysterectomy, and they prove that the operation is followed by a remarkable improvement in the general health of the patients, which is quite independent of the relief to the mechanical troubles ; and it is clearly established that a wombless woman can enter into all the pleasures of life and enjoy them as well as those who have not had the misfortune to develop large tumours in the uterus. A fibroid, even when it does not drain patients by oft-recurring menorrhagia, impairs their vitality and induces a condition which they express by the phrase " never feeling quite well." After extirpation of the tumour the restoration to health is accompanied by increased vigour, which is to them a revelation.

These opinions have recently been confirmed by an admirable inquiry conducted by Crewdson Thomas into the after-history of 100 consecutive cases of supravaginal hysterectomy for fibroids. Among other important conclusions, he states that " hysterectomy does not interfere with the sexual passions," and the retention of an ovary is of striking value " in warding off the severity of an artificial menopause." This is more especially the case when the patient is below forty years ; " above that age the ovaries decrease in value every year " (*Lancet*, 1902, vol. i., p. 294).

Hysteropexy.—*This term implies the fixation of the uterus by means of sutures to the anterior abdominal wall.*

This operation is performed for two conditions: severe retroflexion of the uterus and prolapse of the uterus. The instruments required are those necessary for incising the abdominal wall as for cœliotomy, plus some curved needles of various sizes and degrees of curvature.

1. *Retroflexion of the Uterus—The Steps of the Operation.*—The patient is placed in the Trendelenburg position, and the abdomen is opened as for ovariotomy, except that the incision is shorter. On entering the cœlom the operator determines with his fingers the position and condition of the body of the uterus. If it be free, it is then straightened, and the condition of the ovaries and the tubes ascertained.

In a fair proportion of cases of severe retroflexion of the uterus much of the distress depends upon a prolapsed ovary; should the surgeon deem it necessary to remove the painful ovary and tube in such a case, he can secure the uterus in position by transfixing the pedicle (left after the removal of the ovary and tube) by a silk to the edges of the wound; this retaining suture should pass through the muscle and fascia, as well as the peritoneum.

When it is undesirable to interfere with the ovaries or tubes, then a curved needle, armed with silk, is passed through the aponeurosis and adjacent peritoneum on one edge of the wound, then through the anterior surface of the uterus, and finally through the peritoneum and aponeurosis on the opposite edge of the incision. When this suture is tightened, it will be found to draw the uterus to the anterior abdominal wall, and at the same time approximate the edges of the wound. If desirable, two or more sutures may be introduced. In patients who have had children care should be taken not to pass the needle so deeply into the uterus that the suture comes into the superficial parts of the endometrium. If so the suture may become septic and establish a sinus. The wound is then carefully closed in single, double or triple layers according to the habit of the operator.

2. *Prolapse of the Uterus.*—When hysteropexy is needed for a large, bulky and prolapsed uterus, the steps of the operation are the same as for retroflexion, but it is necessary to introduce a greater number of retaining sutures. Further, as the uterus tends to slip downward into the vagina, it is an advantage, as soon as the fundus of the uterus is drawn into the wound, to transfix it with a stout suture of silk, in order that the assistant may use it as a holdfast to keep the uterus in position whilst the surgeon introduces the main sutures. In some cases, where the uterus is very large, it may be requisite to employ four, five, or even six sutures to secure it to the abdominal wall.

In all cases of hysteropexy the uterus is of necessity sutured to the lower angle of the wound, and is therefore in close relation to the bladder. It facilitates the operation to introduce the lowest sutures first and then gradually work up to the fundus. The wound is then closed and dressed as described for cœliotomy.

After-treatment.—This is conducted on exactly the same lines as after ovariotomy.

The Risks.—When hysteropexy is performed by surgeons experienced in abdominal work it should have no mortality. In a small percentage of cases it has been followed by difficulties during labour. These risks are small when the attachments are made as directed above.

When the fundus of the uterus is secured to the anterior abdominal wall by an aseptic suture, lymph is exuded from the contact surfaces of the peritoneum. This effused lymph organizes into a tenacious tissue, and when, as not infrequently happens, there is great strain on the retaining suture, either from the shortness of the uterus, as happens in virgins, or from the actual weight of the organ when hysteropexy is performed for prolapse, the sutures gradually cut or erode their way out of the uterine fundus, but the plastic material effused around the sutures slowly stretches as the uterus descends into the pelvis and produces the tendon-like structure (Fig. 129) which is sometimes called the "artificial fundal ligament."

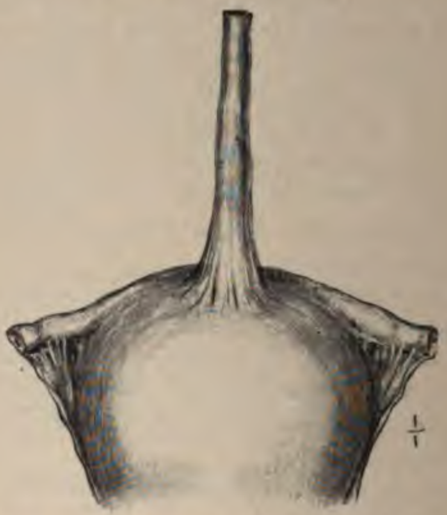


FIG. 129.—THE FUNDUS OF THE UTERUS AND ADJACENT SEGMENTS OF THE FALLOPIAN TUBES.

A long fibrous cord arises from the fundus as a result of hysteropexy (ventro-fixation) performed nearly five years previously for inveterate retroflexion.

Cæsarean Section.—*This signifies the removal of a fœtus and placenta from the uterus through an incision involving the abdominal and uterine walls.*

When it is known some days beforehand that the patient will be submitted to this operation, she should be prepared as for ovariotomy, the vulva and the vagina being thoroughly washed and douched. Often it happens that the operation is undertaken after labour has commenced, and in circumstances which make time very precious. Even then the abdomen, pubes and vulva can be thoroughly washed with warm soap and water, and lightly rubbed with ether and cotton-wool.

Instruments.—A scalpel, probe-pointed knife, volsella, six pressure forceps, scissors, suture-needles (curved and straight), catheter, and sterilized ligature silk.

The Abdominal Incision.—After the patient is under the influence of ether and the bladder emptied with the catheter, an incision is made in the linea alba from the umbilicus to the pubes. The belly wall of a woman advanced in pregnancy is very thin; and, unless the surgeon be cautious, the knife will come in contact with the uterus before he is aware of it.

The uterus lies just under the incision, and the operator ascertains that it lies centrally (often the uterus is somewhat rotated to the right or left), and then makes a free incision through the uterine wall and extracts the fœtus and placenta; as the uterus contracts, he slips his left hand behind the fundus, and grasps the uterus near the cervix, and effectually controls the bleeding. The assistant passes a large warm flat dab into the belly to restrain the intestines and omentum. Should the surgeon be anxious about the bleeding, he may apply a whipcord ligature around the uterus. The uterine cavity is sponged out, and the finger passed through the os uteri into the vagina in order to insure a free passage for blood and serum.

We now come to the most important stage of the operation —namely, suture of the uterine incision. The wall of the uterus has an inner layer of mucous membrane, then a thick stratum of muscle tissue, and finally an outer layer of peritoneum. The wound is first closed with a series of sterilized silk sutures which involve the mucous and adjacent half or thereabouts of the muscular layer. These sutures should be fairly close together, for they not only bring the parts into apposition, but serve to restrain the bleeding. A second row of silk sutures is now inserted, including the serous coat and adjacent half of the muscular layer. These threads should not be tied too tightly, as the tissues of a gravid uterus are soft, and easily tear. In closing the uterine incision the surgeon should not spend time vainly in endeavouring to stanch the bleeding from the edges of the incision ; this is best effected by dexterously inserting and securing the sutures.

The recesses of the pelvis are carefully cleaned by gentle sponging, and the parietal wound closed as after ovariotomy. The dressing varies according to the fancy of the operator ; whatever its nature, it is secured by a firmly adjusted bandage.

Sterilization.—When Cæsarean section is performed the uterus is preserved, and after convalescence the patient is in a position to reconceive. There may be conditions in which the patient is desirous to produce more children, even with the terrible risk before her of having them extracted by Cæsarean section.

On the other hand, women, knowing the great risk they run, ask that steps may be taken to prevent what they consider a catastrophe. This is a very simple matter, and in order to sterilize the patient the surgeon may perform double oöphorectomy, or adopt a simpler method and pass two silk ligatures around each Fallopian tube by transfixing the mesosalpinx, and after tying them firmly divide the tube between the ligatures. Any measure short of this is useless ; conception has on several occasions taken place when the tubes have been secured with a single thread on the plan employed in the ligature of an artery in continuity.

The advantage of sterilization by ligature and division of the tube over double oöphorectomy is that young patients are spared the inconveniences which almost always result from an artificial menopause.

Cæsarean section twenty years ago was one of the most fatal operations in surgery in consequence of septic infection of the peritoneum though the uterine wound. Since the introduction of antisepsis and accurate methods of suturing the uterine incision the mortality varies from 4 to 13 per cent., according to the skill and experience of the operator. But the operation of hysterectomy has become so successful, and has such a low risk, that in cases where Cæsarean section and *sterilization* of the patient are indicated it is preferable to remove the uterus.

Porro's Operation.—This clumsy method of removing the pregnant uterus is now replaced by that described under the title of subtotal hysterectomy (p. 512).

INDEX

ABDOMINAL distension after ovariotomy, 499
    enucleation of myomata, 511
    examination, 23, 431
    hernia, 507
    incision in cœliotomy, 488
    myomectomy, 510
    swellings, 432
Abortion, tubal, 293
Abscess, ovarian, 339
    pelvic, 383
    tubo-ovarian, 267
    vaginal, 134
    vulvar, 81
Absence of the ovaries, 43, 331
    of the uterus, 43
    of the vagina, 43, 53, 64
Accessory adrenals, 11
    ovaries, 56, 331
Adenoma of the Fallopian tube, 272
    of the ovary, 344
Adenomatous disease of the cervical endometrium, 191
        of the corporeal endometrium, 194
Adenomyoma of the uterus, 196
Adhesions, treatment of, 492
Adrenals, accessory, 11
Age, influence of, on sterility, 420
Age-changes in the ovaries, 330
    in the uterus, 138
    in the vagina, 107
    in the vulva, 76
Amenorrhœa, 392
    concealed. See Cryptomenorrhœa, 63, 393
    primary, 393
    secondary, 397
Amputation of the cervix, 473
Anæsthesia, 488
Anæsthesia, examination under, 33
Anamnesis in diagnosis, 424
Anatomy of the Fallopian tube, 2
    of the ovary, 1
    of the pelvic peritoneum, 10
    of the uterus, 3
    of the vagina, 4
    of the vulva, 5
Angeioma of the vulva, 100
Anteflexion of the uterus, 139
Anteversion of the uterus, 139
Apoplexy of the ovary, 337
Appendicitis and salpingitis, 280
Arteries, ovarian, 7
    uterine, anatomy of, 7
        in abdominal hysterectomy, 514
        in vaginal hysterectomy, 478
    vaginal, 8
    vulvar, 8
Ascites, 373, 433
Atresia of the cervix, 64, 68
    of the os externum, 64, 68
    of the os internum, 64, 68
    of the vagina, 52, 64, 67
        operation for, 72
Atrophy of the ovary, 331
    of the uterus, 158
    of the vagina, 107
    of the vulva. See Kraurosis, 89
Auvard's speculum, 444
Axial rotation of fibroids, 215
        of gravid tubes, 301
        of hydrosalpinx, 269
        of ovarian tumours, 360

Bacilli, pathogenic, in vagina, 122
Bacillus, vaginal, 119

- Bartholinian duct, 7
    - abscess of, 81
    - cyst of, 103
  - gland, abscess of, 81
    - anatomy of, 7
    - cyst of, 103
    - inflammation of, 79
- Bed-sores after ovariotomy, 501
- Bimanual examination, 25
- Bladder distension, diagnosis of, 373
  - exstrophy of, 61
  - hernia of, 108
  - injury of, during abdominal operations, 502
    - during vaginal operations, 479
  - regulation of, after ovariotomy, 500
  - separation of, in hysterectomy, 474
- Bleeding after hysterectomy, 481
  - after ovariotomy, 503
- Blood-drip in tubal abortion, 295
- Bowels, regulation of, after ovariotomy, 500
- Broad ligament. See Mesometrium, 10
- Bulbi vestibuli, 5

- Cæsarean section, 520
- Calcification of corpora lutea, 337
  - of fibroids, 208
  - of fœtus, 308
- Calculi, uterine, 209
- Canal of Nuck, anatomy of, 12
    - hydrocele of, 106
- Cancer of the body of the uterus, 248
  - of the cervix, 238
    - with fibroid, 252
    - with pregnancy, 246
  - of the Fallopian tube, 273
  - of the ovary, 354
  - of the vagina, 136
  - of the vulva, 101
- Carunculæ hymenales, 95
  - myrtiformes, 95
- Caruncle, urethral, 96
    - removal of, 453
- Catheterization after ovariotomy, 500
- Cauterization of urethral caruncle, 453
- Cellulitis, pelvic, 381
- Central rupture of perineum, 98
- Cervical canal, dilatation of, 33, 462
- Cervical endometrium, 181
  - fibroids, 210
- Cervix uteri, adenomatous disease of, 191
    - amputation of, 473
    - anatomy of, 4
    - atresia of, 64, 68
    - atrophy of, 158
    - cancer of, 238
      - with fibroid, 252
      - with pregnancy, 246
    - conical, 45
    - fibroids of, 201
      - operation for, 466, 514
    - hyperplasia of, 154
    - laceration of, 173
    - repair of. See Trachelorrhaphy, 470
- "Change of life," 21
- Chorion-epithelioma, 255
    - benignum, 258
    - malignum, 259
- Cicatrix, cancer of, 507
  - yielding, 507
- Cirrhosis of the ovaries, 339
- Clamps for hysterectomy, 479
- Climacteric, 21
  - artificial, 508
  - premature, 393
- Clinical characters of menstruation, 14
- Clitoris, anatomy of, 6
  - carcinoma of, 96
  - elephantiasis of, 96
  - inflammation of, 95
  - removal of, 455
- Closure of wound in cœliotomy, 489
- Cœliotomy, 482, 485
- Colpocleisis, 461
- Colpo-perineorrhaphy, 458
- Colporrhaphy, anterior, 457
  - posterior, 457
- Colpotomy, anterior, 483
  - posterior, 484
- Columns of the vagina, 5
- Conception, retention of products of, 180
- Confinements, history of, in diagnosis, 425
- Conical cervix, 45
- Conservative supravaginal hysterectomy, 512
- Coprostasis, diagnosis of, 374

Cornual pregnancy, 310
Corpora fibrosa, 336
Corpus luteum, anatomy of, 18
  calcified, 337
  cystic, 258, 336
  diseases of, 336
  of pregnancy, 18
Cribriform hymen, 94
Crutch for lithotomy position, 444
Cryptomenorrhœa, 63, 393
Curette, 463
Curetting, 463
Cusco's speculum, 32
Cyclical theory of menstruation, 20
Cystitis a cause of pruritus, 91
Cystocele, 108
  operation for, 457
Cysts, Bartholinian, 103
    removal of, 456
  dermoid, 344
  emptying of ovarian, 492
  Gartnerian, 350
  of hymen, 95
  of Morgagni, 39
  mucous, 103, 136
  ovarian, 343
  papillomatous, 348
  parovarian, 348
  peri-urethral, 137
  sebaceous, 103
  vaginal, 136
  vulvar, 103

Dabs (artificial sponges), 487
Decidua, menstrual, 415
  uterine, in tubal pregnancy, 305
Deciduoma malignum, 255
Dehiscence of the ovum, 17
Dermoids, 344
  suppurating, 359
Development of the generative organs, 36
Diabetes a cause of pruritus, 91
Diagnosis, 424
Diet after ovariotomy, 499
Dilatation of the cervix, 462
    dangers of, 465
Dilators, uterine, 462
Diphtheria of the vulva, 80
Diplococcus of Neisser (gonococcus), 121
Discharges from the female genital passages, 117, 124
Discus proligerus, 17
Displacements of Fallopian tubes, 333
  of ovaries, 332
  of uterus, 139
  of vagina, 108
Distension of abdomen after ovariotomy, 499
  of bladder, diagnosis of, 373
Dorsal position for examination, 24
Double uterus, 48
    atresia of, 54, 64
  vagina, 48
Douglas, pouch of, 11
Drainage in cœliotomy, 490
Dressings for abdominal wounds, 489
Dysmenorrhœa, 409
  membranous, 415
Dyspareunia, 418

Echinococcus colonies in the Fallopian tubes, 390
    in the mesometrium, 389
    in the omentum, 390
    in the pelvis, 388, 390
    in the uterus, 388
    in the vagina, 137
    secondary infection by, 390
Eczema of the vulva, 85
Elephantiasis of the clitoris, 96
  of the vulva, 87
Elytrorrhaphy, 457
Embolism after cœliotomy, 505
Embryo, sexual organs of, 37
Endometritis, acute, 182
  cervical, 191
  chronic, 185
  corporeal, 194
  glandular, 186
  hæmorrhagic, 187, 195
  interstitial, 186
  polypoid, 195
  puerperal, 182
  senile, 187
  villous, 187, 195
Endometrium, adenomatous disease of, 191
  anatomy of, 19, 181
  diseases of, 181
  morphology of, 181
  tuberculosis of, 188
Enema rash, 486
Enterocele, 112

Enucleation of broad ligament cysts, 494
    of fibroids, abdominal, 511
        vaginal, 468
    of sessile ovarian cysts, 494
Epithelial infection of peritoneum, 378
Erosion of the cervix, 191
    of the gravid tube, 301, 304
Erysipelas of the vulva, 80
Evacuation of the cyst in ovariotomy, 492
Examination, abdominal, 23, 431
    bimanual, 25
    recto-abdominal, 25
    under an anæsthetic, 33, 439
    vaginal, 24, 434
Excision of tumours of the labia, 455
    of urethral caruncle, 453
Exploration of the uterine cavity, 33
Exstrophy of the bladder, 61
External os uteri, 4
    atresia of, 52, 64
Extra-uterine gestation, 283

Fæcal fistula after operation, 480, 506
Fallopian tubes, adenoma of, 272
        anatomy of, 2
        carcinoma of, 273
        development of, 36
        echinococcus colonies of, 390
        hernia of, 333
        inflammation of, 263
        papilloma of, 273
        pregnancy in, 286
        removal of, 484
        sclerosis of, 270
        tuberculosis of, 270
        tumours of, 272
Fergusson's speculum, 31
Fibrocystic tumours of the uterus, 207
Fibroids of the uterus, 198
    cervical, 201
        operation for, 466, 514
    latent, 203
    of the mesometrium, 387
    of the ovarian ligament, 387
    of the ovary, 352
    of the round ligament, 386
    uterine, axial rotation of, 215
        calcification of, 208
Fibroids, uterine, clinical characters of, 224
        degenerations of, 207
        fatty metamorphosis of, 207
        impaction of, 213
        in relation to menstruation, 217
        in relation to the menopause, 222
        intramural, 198
        malignancy of, 209
        mucoid degeneration of, 207
        operation for, 466, 510
        septic infection of, 212
        submucous, 200
        subserous, 201
        with pregnancy, 218
    treatment of, 229
Fibroma of the ovary, 352
Fibrosis of the uterus, 187
Fistula, detection of, 115
    operations for, 458
    recto-vaginal, 115, 461
    uretero-vaginal, 115, 461
    urethro-vaginal, 115
    utero-vesical, 116, 461
    vesico-vaginal, 115, 459
Flexions of the uterus, 139
Flushing curette, 463
Follicle, Nabothian, 182
    ovarian, 17
Forceps, left in abdomen, 504
    removal after hysterectomy, 481
Foreign bodies in the uterus, 189
    in the vagina, 113
    left in the abdomen, 504
Fossa navicularis, 7
    ovarii, 12
    recto-vaginal, 11
    utero-vesical, 11
Fourchette, anatomy of, 5
    laceration of, 98

Gangrene of the vulva, 83
Gartner's duct, anatomy of, 2
        cysts of, 136, 350
Genu-pectoral position, 26
Glands of Bartholin, abscess of, 81, 104
        anatomy of, 7
        cysts of, 103
    uterine, 181

Glandular endometritis, 186
Glycerin tampons, 185, 194
Gonococcus, characters of, 121
Gonorrhœa, 78, 130
Gonorrhœal endometritis, 182
    rheumatism, 133
    salpingitis, 131, 258
    urethritis, 78
    vaginitis, 130
    vulvitis, 78
Graafian follicle, 17
Gravid tube, erosion of, 301, 304
        rupture of, 301
    uterus, retroversion of, 228
Gynæcological operations, 440

Hæmatocele, 297, 302
Hæmatocolpos, 64
    lateral, 64, 68
    operation for, 72
Hæmatoma of the vulva, 82
Hæmatometra, 64
Hæmatosalpinx, 64, 269
Hæmatotrachelos, 64
Hæmorrhage after hysterectomy, 481
    after ovariotomy, 503
    from fibroids, 211
Hæmorrhagic endometritis, 187
Hermaphrodism, 57
Hernia, abdominal, 507
    inguinal, 105
    of Fallopian tube, 333
    of the ovaries, 333
    of the pelvic floor, 108
    vaginal, 112
    ventral, 507
Herpes of the vulva, 86
Hodge pessary, 161
Homology of the male and female generative organs, 41
Hottentot apron, 77
Hydatid mole, 256
Hydatids (echinococcus colonies), 388
Hydrocele of the canal of Nuck, 106
    ovarian, 351
Hydroperitoneum, 379
Hydrops tubæ profluens, 269
Hydrosalpinx, 267
    intermitting, 269
Hymen, anatomy of, 6
    caruncles of, 95
    cysts of, 95
Hymen, imperforate, 52, 64, 67
    rupture of, 95
    variations in the shape of, 95
Hyperplasia of the cervix, supravaginal, 154
        vaginal, 157
Hypertrophy of the labia minora, 77
Hypospadiac male, 58
Hysterectomy, 512
    conservative supravaginal, 512
    remote effects of, 517
    risks of, 516
    subtotal, 512
    supravaginal, 512
    total (pan-hysterectomy), 515
    vaginal, 477
Hysteropexy for prolapse, 519
    for retroflexion, 517
Hysterotomy, 512

Impaction of gravid uterus, 228
    of fibroids, 213
    of ovarian tumours, 364
Imperforate hymen, 52, 64, 67
Incision, abdominal, 488
    closure of, 489
Incomplete tubal abortion, 296
    ovariotomy, 495
Infantile uterus, 45
Infection of fibroids, 212
    of peritoneum, 377
Inflammation of the clitoris, 95, 263
    of the Fallopian tubes, 276
    of the ovaries, 338
    of the pelvic peritoneum, 377
    of the pelvic cellular tissue, 381
    of the uterus, 182
    of the vagina, 127
    of the vulva, 78
Injuries of the bladder, 479, 502
    of the intestine, 480, 502, 506
    of the ureter, 480, 502
    of the uterus, 173
    of the vagina, 112
    of the vulva, 77
Insanity after ovariotomy, 505
Instruments for diagnosis, 26
    for operation, 444
    sterilization of, 445
Intermenstrual pain, 417
Intermitting hydrosalpinx, 269
Intestinal obstruction after cœliotomy, 506
        from fibroids, 216

Intestine, injury of, 480, 502, 506
Inversion of the tubal fimbriæ, 264
  of the uterus, 166
Irrigation in cœliotomy, 489
  intra-uterine, 184
Ischuria paradoxica, 228

Kidney tumours, diagnosis of, 374
Kobelt's tubes, 2
Kraurosis vulvæ, 89

Labia majora, abscess of, 81, 104
    anatomy of, 5
    cysts of, 103
    hæmatoma of, 82
  minora, anatomy of, 5
    hypertrophy of, 77
  See also Vulva
Labour complications after vaginal fixation, 484
Laceration of the cervix, 173
    repair of, 470
  of the perineum, 97
    repair of, 446
Lateral hæmatocolpos, 64, 68
  hæmatometra, 64
  position for examination, 26
Leucorrhœa, 125
  a cause of pruritus, 91
  a cause of sterility, 422
  value of, in diagnosis, 193
  varieties of, 125
Leukoplakia of the vulva, 87
Ligaments, broad. See Mesometrium, 10
  ovarian, 2
  round, 4, 12
  tubo-ovarian, 3
  utero-sacral, 11
Ligature, fate of, 506
  material, 486
  of pedicle, 492
  versus clamps in hysterectomy, 479
Lipomata of the mesometrium, 386
  of the vagina, 135
  of the vulva, 100
Lithopædion, 308
Lithotomy position for examination, 26
Liver, diagnosis of enlargements of, 375
Lupus of the vulva, 87

Lutein cysts, 258, 336
Lymphatics of the genital organs, 9

Malformations of the external genital organs, 43
  of the ovaries, 331
Malignancy of dermoids, 347
  of fibroids, 209
Marsupialization of cysts, 495
Membrana granulosa, 17
Membranous dysmenorrhœa, 415
Menopause, 21
  artificial, 508
  premature, 393
Menorrhagia, 400
Menstrual blood, characters of, 15
    retained, characters of, 69
Menstruation, absence of. See Amenorrhœa, 392
  cessation of. See Menopause, 21
  clinical features of, 14
  concealed. See Cryptomenorrhœa, 393
  cyclical theory of, 20
  in diagnosis, 425
  in monkeys, 19
  in relation to fibroids, 217
  in relation to operation, 442
  ovulation theory of, 20
  painful. See Dysmenorrhœa, 409
  physiology of, 16
  profuse. See Menorrhagia, 400
  significance of, 20
  uterine changes during, 19
Mesometric gestation, 304, 326
Mesometrium, abscess of, 383
  anatomy of, 10
  cysts of, 350
  echinococcus colonies in, 389
  inflammation of, 381
  lipomata of, 386
  myoma of, 386
  sarcomata of, 387
Mesonephric ducts, 36
Mesonephros, 36
Mesosalpinx, 11
Metritis. See Endometritis, 182
Metrorrhagia, 400
Metrostaxis, 501
Micro-organisms in the vagina, 124
Miscarriages, history of, in diagnosis, 425

Mittelschmerz, 417
Mole, hydatid, 256
  tubal, 289
Monilia candida in the vaginal secretions, 118
Mons Veneris, 5
Morgagni, cyst of, 39
Mucoid degeneration of myomata, 207
Mucosa, uterine, 19, 181
  changes during menstruation, 19
Mucous cysts of vagina, 136
    vulva, 103
  membrane. See Endometrium, 181
  polypus, 192
Müller's duct, 36
Mumps in relation to oöphoritis, 338
Myoma. See Fibroids, 198
Myomectomy, abdominal, 510
  vaginal, 466
Myxomata of the vulva, 100

Nabothian follicles, 182
Nerves of the genital organs, 9
Neugebauer's speculum, 33
Neuralgia, ovarian, 340
Nuck, canal of, anatomy of, 12
    hydrocele, 106
Nymphæ. See Labia minora, 6

Obesity, diagnosis from ovarian tumours, 371
Obstruction, intestinal, after cœliotomy, 506
Occlusion of the cervical canal, 52, 64
  of the ostium tubæ, 264, 289
  of the vagina, 52, 64
Œdema of the vulva, 83
Omentum, hydatids of, 390
Oöphorectomy, 497
Oöphoritis, 338
  and parotitis, 338
Oöphorocele, 333
Oöphoron, anatomy of, 2
  cysts of, 343
  See also Ovary
Ophthalmia a complication of gonorrhœa, 133
Ostium tubæ, occlusion of, 264, 289
Os uteri, 4
  atresia of, 52, 64
Ovarian abscess, 339
  arteries, 7
  concretions, 337
  cysts, 343
  follicle, 17
  fossa, 12
  hydrocele, 351
  ligament, anatomy of, 2
    tumours of, 387
  neuralgia, 340
  pouch, 11
  pregnancy, 284
  tumours, 342
  veins, 8
Ovariotomy, 491
  after-treatment of, 499
  anomalous, 496
  during pregnancy, 369
  incomplete, 495
  remote effects of, 508
  repeated, 496
  risks of, 501
Ovary, abscess of, 339
  accessory, 331
  adenoma of, 344
  age-changes of, 330
  anatomy of, 1
  apoplexy of, 337
  atrophy of, 331
  carcinoma of, 354
  cirrhosis of, 339
  cysts of, 343
  dermoids of, 344
  displacements of, 332
  fibroma of, 352
  fibrosis of, 340
  hernia of, 333
  inflammation of, 338
  malformations of, 331
  myoma of, 352
  papilloma of, 348
  prolapse of, 334
  rupture of, 361
    septic changes in, 358
    with pregnancy, 366
  sarcoma of, 352
  supernumerary, 331
  tuberculosis of, 339
  tumours of, 342
    axial rotation of, 360
    differential diagnosis of, 371
    impaction of, 364
    in labour, 368

Ovary, tumours in the puerperium, **369**
  undescended, 332
Ovula Nabothii, 182
Ovulation, 17
Ovum, dehiscence of, 17

Pain, value of, in diagnosis, 427
Pampiniform plexus, 8
Pan-hysterectomy, 515
Papilloma of the Fallopian tube, 273
  of the ovary, 348
  of the peritoneum, 378
  of the vulva, 100
Parametritis, 381
Paratubal hæmatocele, 302
Paroöphoron, anatomy of, 2
  cysts of, 347
Parotitis after ovariotomy, 505
  and oöphoritis, 338
Parovarium, anatomy of, 2
  cysts of, 348
Pedicle, ligature of, 492
  of gravid tubes, 301
  of hydrosalpinx, 269
  of ovarian tumours, 360
  twisted, of fibroids, 215
Pediculus pubis a cause of pruritus, 92
Pelvic abscess, 383
  cellulitis, 381
  peritoneum, anatomy of, 10, 12
    epithelial infection of, 378
    septic infection of, 377
  tumours, diagnosis of, 374, **436**
Perforation of the intestine, 506
  of the uterus, 176
Perimetritis, septic, 377
  serous, 378
Perineorrhaphy, 446
Perineum, anatomy of, 97
  laceration of, 97
  repair of, 446
Perioöphoritis, 339
Peritoneum. See Pelvic peritoneum
Peritonitis after ovariotomy, 503
  gonorrhœal, 264
  puerperal, 264, 377
  septic, 377
  tubercular, 379
Peritubal hæmatocele, 297
Peri-urethral cysts, 157
Pessaries, 160
Pessary, Hodge, 145, 161
  retained, 164
  ring, 161
  vaginal stem, 163
Phantom tumour, 372
Physical examination in diagnosis, **431**
Physometra, 124
Pinhole os, 45
Placenta, retained portions of, 180
  tubal, 305
    treatment of, 327
Placental polypus, 180
Polypus, cervical, 192
  fibroid, 200
  mucous, 192
  operation for, 466
  placental, 180
Porro's operation, 523
Pouch of Douglas, 11
  ovarian, 11
Pregnancy, cornual, 310
  diagnosis of, from fibroids, 226
  diseases arising from, 176
  extra-uterine, 283
  mesometric, 304
  normal signs of, 227
  ovarian, 284
  spurious, 372
  tubal, 286
  tubo-uterine, 308
  utero-abdominal, 313
  with carcinoma of the cervix, 246
  with fibroids, 218
Pregnant uterus, impaction of, 228
    injuries of, 503
    operations on, 520
    retroversion of, 228
Preparation of patients for operation, **443**
Primary sexual characters, 35
Procidentia of the uterus, 148
Products of conception, retention of, 180
Prolapse of the ovary, 334
  of the uterus, 148
  of the vaginal walls, 108
Pruritus vulvæ, 91
Pseudo-cyesis, 372
Pseudo-hermaphrodism, 57
Puberty, onset of, 14
Puerperal peritonitis, 264, 377

Pulse after ovariotomy, 500
Pyocolpos, 66
Pyometra, 66, 241
Pyosalpinx, 66, 266
  complicating fibroids, 213

Racemose adenomata, 193
  sarcoma of the neck of the uterus, 236
Rectal examination, 25
Rectocele, 108
  operation for, 112, 457
Recto-vaginal fossa, anatomy of, 11
Remote effects of hysterectomy, 517
    of ovariotomy, 508
Renal tumours, diagnosis of, 374
Replacement of uterus digitally, 145
    with the sound, 145
Repositor, uterine, 171
Retained menstrual products, 63, 393
  pessary, 164
  products of conception, 180
Retroflexion of the uterus, 140
Retroversion of the uterus, 142
  of the gravid uterus, 228
Reversible tenacula forceps, 470
Rheumatism, a complication of gonorrhœa, 133
Rima pudendi, 5
Ring pessary, 161
Rotation, axial, of fibroids, 215
    of gravid tube, 301
    of hydrosalpinx, 269
    of ovarian tumours, 360
Round ligament of the uterus, anatomy of, 4, 13
    shortening of, 154
    tumours of, 386
Rudimentary uterus, 44
Rupture of ovarian cysts, 361
  of perineum, 97
  tubal, 301
    diagnosis of, 314
    treatment of, 324

Saline transfusion, 490
Salpingitis, 263, 276
  and appendicitis, 280
  tubercular, 270, 278
Salpingocele, 333
Salpingo-oöphorocele, 333
Sarcoma of the mesómetrium, 387
  of the ovary, 352
Sarcoma of the uterus, 233
  of the vagina, 135
  of the vulva, 83
Sclerosis of the tubes, 270
Sabaceous cysts of vulva, 103
Secondary sexual characters, 35
Secretions, normal, 117
  pathological, 120
  uterine, 120
  vaginal, 117
Semi-prone (Sims') position, 26
Septic infection of fibroids, 212
    of ovarian tumours, 358
    of peritoneum, 377
    of retained menses, 66
    of products of tubal gestation, 308
Sexual characters, primary and secondary, 35
    influence of ovariotomy on, 508
Shock after ovariotomy, 501
Shortening of the round ligaments, 154
Shot-and-coil sutures, 473
Silk for suture and ligature, 487
Sims' position, 26
  speculum, 32
Single-horned uterus, 46
Sound, uterine, 26
Speculum, Auvard's, 444
  Cusco's, 32
  Fergusson's, 31
  Neugebauer's, 33
  Sims', 32
Spleen, diagnosis of enlargement of, 374
Sponges left in abdomen, 504
  artificial, preparation of, 487
Spurious pregnancy, 21, 372
Stenosis of the os externum, 45
  of the vagina, 44, 133
Sterility, 420
Sterilization of instruments, 445
  of patient during Cæsarean section, 522
Sterilizer, 445
Subinvolution of the uterus, 177
Subtotal hysterectomy, 512
Superinvolution of the uterus, 159, 176
Supernumerary ovaries, 331
Suppuration of Bartholinian cysts, 104

- Suppuration of ovarian cysts, 358
  - of products of tubal gestation, 308
- Supravaginal hysterectomy, 512
- Suture material, 486
- Sutures, removal of, 501
  - shot-and-coil, 473
- Syphilis of the vulva, 87

- Tampons, glycerin, 185, 194
- Temperature after ovariotomy, 500
- Tenacula forceps, reversible, 470
- Tents, 33
- Tetanus after ovariotomy, 505
- Thrombosis after ovariotomy, 505
- Trachelorrhaphy, 470
- Transfusion, 490
- Trendelenburg position, 487
- Tubal abortion, 293
  - erosion of, 301, 304
  - mole, 289
  - pregnancy, 286
    - bilateral, 320
    - changes in the tube, 288
    - diagnosis of, 314
    - operation for, 324
    - repeated, 319
    - rupture of, primary extra-peritoneal, 303
      - primary intraperitoneal, 303
      - secondary intraperitoneal, 308
    - treatment of, 323
    - twin, 286
    - with uterine pregnancy, 320
- Tuberculosis of the Fallopian tube, 270, 278
  - of the ovary, 339
  - of the peritoneum, 270, 379
  - of the uterus, 188
  - of the vulva, 86
- Tubo-ovarian abscess, 267
  - cyst, 269
  - ligament, 3
- Tubo-uterine gestation, 309
- Tumours of the broad ligament, 387
  - of the Fallopian tubes, 272
  - of the mesometrium, 387
  - of the ovarian ligament, 387
  - of the ovaries, 342
  - of the round ligament, 386
- Tumours of the uterus, 198
  - of the vagina, 135
  - of the vulva, 100
- Twisted pedicle, 215, 269, 301, 360

- Ulceration of the vagina in procidentia, 151
- Undescended ovaries, 332
- Ureter, anatomy of, 13
  - injury of, 480, 502
- Uretero-vaginal fistula, 115
    - operation for, 461
- Urethra, diseases of, 96
- Urethral caruncle, 96
    - operations for, 453
- Urethrocele, 108
- Urethro-vaginal fistula, 115
- Uro-genital sinus, 36
- Uterine arteries, 7
  - calculi, 209
  - changes in menstruation, 19
  - dilators, 462
  - lymphatics, 9
  - nerves, 9
  - repositor, 171
  - souffle in fibroids, 225
  - sound, 26
    - contra-indications to use of, 28
    - information derived from, 29
    - mode of using, 28
  - veins, 8
- Utero-abdominal pregnancy, 313
- Utero-sacral ligaments, 11
- Utero-vesical fistula, 116, 461
  - fossa, 11
- Uterus, absence of, 43
  - age-changes in, 138
  - anatomy of, 3
  - anteflexion of, 139
  - anteversion of, 139
  - atrophy of, 158
  - bicornis, 48
    - unicollis, 49
  - cancer of, 238, 248
  - deciduoma of. See Chorion-epithelioma, 255
  - didelphys, 49
  - displacements of, 139
  - echinococcus colonies of, 388
  - fibromyoma of, 198
  - fibrosis of, 187
  - flexions of, 139

Uterus, foreign bodies in, 189
  hyperplasia of, 154
  infantile, 45
  inflammation of, 181
  injuries of, 173
  inversion of, 166
  measurements of, 138
  myomata of, 198
  perforation of, 176
  procidentia of, 148
  prolapse of, 148
  removal of, 512
  retroflexion of, 140
  retroversion of, 142
    of gravid, 228
  rudimentary, 44
  sarcoma of, 233
  septus, 48
  single-horned, 46
  subinvolution of, 177
  superinvolution of, 159, 176
  tuberculosis of, 188
  tumours of, 198
  unicornis, 46
    pregnancy in rudimentary horn of, 311

Vagina, abscess of, 134
  absence of, 43, 64
  age-changes in, 107
  anatomy of, 4
  atresia of, 52, 64
    operation for, 72
  carcinoma of, 136
  cysts of, 136
  diseases of, 108
  displacements of, 108
  double, 48
    treatment for, 72
  echinococcus colonies of, 137
  fistulæ of, 114
  foreign bodies in, 113
  hernia of, 112
  infection of, 120, 127
  inflammation of, 127
  injuries of, 112
  lipomata of, 135
  mucous cysts of, 136
  myomata of, 135
  normal secretion of, 117
  sarcoma of, 135
  secretions of, 117
  stenosis of, 44, 133
  tumours of, 135
Vagina, ulceration of, in procidentia, 151
Vaginal arteries, 8
  bacillus, 119
  discharges, 124
  enucleation of fibroids, 466
  examination, 24
  fixation of the uterus, 483
  hysterectomy, 477
  infection, 120, 127
  myomectomy, 466
  veins, 9
Vaginismus, 418
Vaginitis, gonorrhœal, 130
  in children, 129
  in pregnant women, 127
  senile, 127
  septic, 130
  simple, 129
Varix of the vulva, 81
Veins, ovarian, 8
  uterine, 8
  vaginal, 9
  vulvar, 9
Ventro-fixation of the uterus, 517
Vesical symptoms, 429
Vesico-vaginal fistula, 115
    operation for, 459
Vestibule, 7
Volsella, 31
Vomiting after ovariotomy, 499
Vulva, abscess of, 81, 104
  age-changes of, 76
  anatomy of, 5
  angeioma of, 100
  atrophy of, 89
  carcinoma of, 96, 101
  cysts of, 103
  diphtheria of, 80
  eczema of, 85
  elephantiasis of, 88, 96
  erysipelas of, 80
  fibromata of, 100
  gangrene of, 83
  hæmatoma of, 82
  herpes of, 86
  hypertrophy of, 77
  inflammation of, 78
  injuries of, 77, 97
  irritation of, 91
  kraurosis of, 89
  leukoplakia of, 87
  lipoma of, 100
  lupus of, 86

Vulva, myxomata of, 100
  œdema of, 83
  papillomata of, 100
  pruritus of, 91
  sarcomata of, 101
  syphilis of, 87
  tuberculosis of, 86
  tumours of, 100
    removal of, 455
  varix of, 81
  warts of, 100
Vulvar arteries, 8
Vulvar, lymphatics, 9
  nerves, 9
  veins, 9
Vulvitis, gonorrhœal, 78
  pruriginosa, 88
  simple, 78
Vulvo-vaginitis in children, 129

Wolffian body, 36
  duct, 36
Wound, abdominal, closure of, 489

THE END

Rebman Limited 129 *Shaftesbury Avenue, London, W.C.*

N201 Bland-Sutton, John
B642 Diseases of women
1906
38201

NAME	DATE DUE